# JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

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## EDITORIAL NOTES—GAS, &c.

### The Welsh Institution at Swansea.

IF the members of the Wales and Monmouthshire Institution of Gas Engineers and Managers had only had one object in their meeting at Swansea last Wednesday, and that to do honour to the *doyen* of the profession in the Principality (Mr. Thornton Andrews, M.Inst.C.E.), the purpose would have been fully worthy of the occasion. It is the jubilee year of Mr. Andrews' service in the dual capacity of Engineer and Secretary to the Swansea Gas Company. Fifty years! Mr. Andrews truly has been no rolling stone; and he has gathered plenty of moss of the right genus for his Company. Whatever may be the history of the concern in the future, and it promises to continue along the course of full prosperity, the period of the present official headship will stand out prominently for all time as one of business foundation, consolidation, and development. The fifty years not in Swansea alone but throughout the gas industry have witnessed a remarkable change in condition. Competition has come; invention has assisted to meet it, but energy has been required to supplement invention. New and fruitful branches of business have been opened up; and fresh commercial ability and activity have been brought to bear upon them. Competition and the excesses of unionist labour have called for economies in production; engineering skill has been evoked, and has answered. With all, the fast-growing responsibilities have been met at Swansea, notwithstanding advancing years. Dignified conduct and faithful performance have rooted deeply honour and confidence. This was so manifest last Wednesday, that Mr. Thornton Andrews' professional colleagues and neighbours rejoiced, and endorsed with spontaneous wholeheartedness the rich sentiments expressed by their retiring President (Mr. Thomas Canning). Among Mr. Andrews' most treasured possessions will now be numbered the very effectively illuminated address with which he was presented by the members. The words of the address, conveying the simple truth and the kindly wish, will by him be valued more than silver or gold.

The Presidential Address delivered on the occasion by Mr. Robert A. Browning might well have been entitled "Modern Experiences at Neath." It aspired to no general survey of the doings of the gas industry; and it left severely alone all the polemical questions of the hour. Its worth is found in the unembroidered tale of practical experience, which the President presents, without claim for superiority, but as, in the various directions, purely personal testimony. That testimony he leaves to the judgment of his contemporaries, in the hope that it will at least be of value in any consideration they may have to give to like subjects and working problems. In his carbonizing operations, he has adopted, and for very good reasons, the De Brouwer projector; but in considering what he has to say concerning it, and especially the figures, the limitations imposed upon the machine in its operation will be borne in mind.

Though history is continually repeating itself, its successive lessons are lost upon the leaders of trade unionism. Their excesses have been as great an effective cause in the steady march of mechanical operation in the gas and other industries, as have been the demands pressed by competition for more economical production. Mr. Browning indeed, in his address, makes no secret of the fact that the terms imposed by the Gas Workers' Union—resulting in a serious increase in wages, and a concurrent degeneration of the return in work—were the impelling reasons for giving consideration to, and finally applying, mechanical retort charging at Neath. The methods of trade unionism nowadays are certainly directed to strangling the "geese" that lay the golden eggs for its disciples. Competition, however, will not admit of this kind of thing; and carbonizing wages alone at 3s. 7·77d. per ton—and who knows when they would have gone higher?—was a sure way, in the face of competition that is bound to be even keener in the future than in the present, of helping the business of the Neath Gas-Works if not on to the road to ruin, on to the road to restricted trading. This is a consideration that, while in work, did not trouble the minds of the gas workers of Neath, much less the elastic consciences of their subtle mentors. The President estimated that the possession of a De Brouwer projector would enable him to reduce his carbonizing costs to 1s. 9·1d. per ton; but he was disappointed. The Gas Workers' Union again interposed, with the result that the actual wages now work out (with the projector) to 2s. 3·71d. per ton—at least 6d. more than they ought to be under the conditions of Neath, but at any rate a saving of 1s. 4d. per ton compared with the old hand work. It will not be overlooked that hand work still continues apart from the operation of coal handling and retort charging.

It would, however, be of interest to obtain an analysis of the item of "wages" in the President's tables, so as to see the exact operations that it covers. We can quite sympathize with Mr. Thornton Andrews' appeal for some standard form of comparison in this matter. The difficulty has often been felt. In the "JOURNAL" we contended for something in the shape of an acceptable standard long since; and Mr. W. R. Herring and others strongly supported the argument in favour. But nothing came of it, beyond the suggestions by Mr. Herring in his 1905 Institution paper and previously, but which suggestions have never been seriously debated by gas engineers. However, this is an aside. Reverting to the President's address, his experience as to the slight repairs required by the De Brouwer projector is noticed. It endorses the experience elsewhere. In his case 15,600 tons of coal have been dealt with by the projector without any renewals to the belt or any other part of the machinery; and no doubt he will ascend to the higher figures that have been reached in other works, before a belt replacement is called for. A certificate to the good conduct and reliability of the spiral-guided holder at Neath is also given by Mr. Browning; and it is a matter of supreme interest to learn that gas traction is still the vogue on the Neath tramways. It is about seven years since what was being done in the town in this direction was described in the "JOURNAL;" but absence of subsequent history had caused the fear that the system had not stood the test of time.

What may be described as a practical memoir upon the subject of "Tar as a Dust Preventer for Public Roads" was presented by Mr. Walter Lister, of Godalming, who was formerly located in Wales. This is the first time that the question has—before or after Sir George Livesey interpolated the matter in the proceedings at the meeting of the Institution of Gas Engineers—been in set form before gas engineers in conference; and we hope it will be prominent at the forthcoming meetings of the District Associations. Since the article in the "JOURNAL" for the 28th ult., much evidence has accrued that gas engineers are here and there taking a very lively interest in this matter; but the sooner activity breaks out into further publicity, the better will be the general knowledge in prosecuting the opening up of the new outlet for tar. Both from the paper and discussion on Wednesday, fresh testimomy issued as to gas-works tar—without distillation as suggested by Mr. Maybury recently—being efficacious for road purposes; and figures quoted by the author and by Mr. Canning show that the work can be done for well under 1d. per square yard. And mechanical means may enable the expense to be even further reduced by increasing the speed at which the work is accomplished. The aim must be—it is imperative if good is to be reaped—to make the work as cheap as possible, and to make it popular; otherwise the field will soon be invaded by a still greater number than at present of competitive liquids with titular

descriptions terminating in "ite." Mr. Acland, of Llanelly, speaks of a good price being paid for the tar. It must be repeated that the whole object of encouraging the develcpment of this utilization, which is unproductive in monetary profit, is to help to reduce the supply of tar, so that those who use it for manufacturing purposes may be compelled to share with the gas industry, as they have never shared yet, some of the handsome profits that they derive from this bye-product. It was the privilege of Mr. Jones, of Burslem, to announce that Mr. Maybury had acknowledged that the form of the evidence he gave before the Motor Car Commission had created an impression which was not intended, and that he was entirely in favour of the use of gas-works tar. Mr. Jones also made the suggestion that the Institution of Gas Engineers should take up the matter, and bring it before the whole of the road authorities of the country. This is a commercial question to deal with which no machinery exists at present in the Institution. It is entirely a business that gas undertakings severally or unitedly must themselves prosecute if benefit is to ensue. Meanwhile let there be experiment—in the private approaches to the gas-works if the local road authority cannot be moved ; but if they can, do not let their experiment fail for the want of collaboration.

In view of Mr. Thornton Andrews' jubilee, great interest centred about the works of his Company. Their most prominent features are modern, as will be seen in the descriptive account prepared by Mr. George Andrews, who is his father's chief assistant in the management of the works.

## Provincial Gas Companies.

Drawing near the end of the half-yearly reports of gas companies carrying on their operations in the Provinces, it is a pleasure to glance over them, and note how general has been the prosperity in the gas industry throughout the country. There are very few cases where there has not been increased business, and then the local conditions of trade are obviously the retarding influences. Considering the sharpness of the electrical competition, and the economizing effect of the incandescent gas-burner, that there have been increases in consumption at all is something to be thankful for. But in some cases the increases have been substantial—for instance, 7·21 per cent. in the case of Sheffield ; and 3 per cent. for Liverpool represents a considerable volume of gas. Smaller companies have enjoyed, in proportion, an equal progress, in towns both residential and manufacturing. From all quarters come reports that there is no abatement in the demand for cooking and heating stoves and prepayment meters, and that the increases in consumption have been fairly well spread over all classes of consumers, now that the worst consumption-reducing effect of the incandescent burner is being surmounted. Deserving of especial notice in this connection, is the novel method of encouraging the study of cooking in girls' schools that has been adopted by the Directors of the Wakefield Gas Company, who have presented a shield for competition. It has aroused much interest in the seminaries of the city. Residuals taken altogether have not ruled so good during the half year ; but the prospects warrant an expectation of better returns. Cases are fairly scarce where the amount required for dividend has not been earned ; but in those instances it is generally found that growth in consumption has not yet succeeded in counterbalancing the reductions of price, and upon this has fallen the (apparently) temporary decline in the value of residuals.

Reductions in price have been made in many towns during the half year. In Sheffield, the Company have now got down to an average price of 1s. 4·4d. per 1000 cubic feet ; the ordinary price being 1s. 5d. for gas of nearly 17½-candle power. In Liverpool, the charge is now 2s. 6d. for 20-candle gas, tested by a flat-flame burner. There has been in several places increased expenditure in works' improvement to produce economies in production ; and the investment of the capital and the charges to maintenance and repairs have been fully justified by results. Distribution expenses continue on the up-grade, owing to the changes in the character of the business compared with olden times, when the greatest proportion of custom was confined to the tranquil business of flat-flame lighting, which, after the service was connected, demanded only the reading of meters, and the distribution and collection of the accounts. The advanced prices of coal have been mentioned at several meetings ; and these will naturally make a difference in next half-year's accounts.

Reference has been somewhat frequent by chairmen to additions to the item of rates and taxes. It would now be a pleasant surprise to have a reversal of the tale. Modern local government, however, gives no indication of having reached the zenith of its ambition. The Liverpool Company announce an increase of £2191 in their payments under this head ; and at Sheffield, Mr. Wilson Mappin (who presided at the proprietors' meeting in the absence of Sir Frederick Mappin through illness, which we greatly regret) gave an excellent illustration of the favoured treatment of municipal electricity supply in this respect. The Corporation electric light undertaking has a capital of some £830,000; the Gas Company, of £963,000. The electricity undertaking are only required to pay £2473 in rates (including income-tax) ; while the Gas Company have to pay £18,700, or nearly eight times more! The old, old story. What would the Assessment Committee say if the Gas Company and the other large industrial firms approached them, and asked to be assessed on the same terms as the Electricity Department? While this unequal condition exists, there are periodical agitations on the part of the Electricity Committee for the taking away of some of the street lighting from the Gas Company. But the City Council are wise. The rates in the city are 9s. 2d. in the pound ; and when the Council can get 320 miles of streets illuminated by 10,000 lamps (of which 1200 contain from two to four incandescent gas-burners), for a cost of £12,000, they cannot afford to change to a more expensive form of lighting—not even to please a minority of their own members. Another phase of this question of the supply of electricity by municipalities is suggested by the Sheffield Company's proceedings, and the labour members of local bodies should note it. It is this, that the more they encourage municipal electricity supply, the more are they injuring their own class, by lessening the scope of employment ; seeing that, in the production and distribution of electricity, fewer hands are required than for the manufacture and distribution of gas. The wages bill of a gas company is usually several times larger than that of an electricity concern operating in the same town. If we except the unfairness of municipal competition, the Gas Companies of the Provinces have, on the whole, the very best of reasons for satisfaction over the trading of the past half year.

## Trades Unionism and its Power, Both Present and Hoped For.

The Trades Union Congress has been held at Liverpool during the past week, under circumstances for the delegates of a more congenial nature than, owing to considerations of a political character, have been permitted them for many a long year. When the delegates were assembled last year, the wildest flights of their imagination had not produced the anticipation that the spring of this year would see such a number as over fifty Labour members sitting in the House of Commons, nor that Mr. John Burns would be invested with such sovereign power as is entrusted to the President of the Local Government Board. The Parliamentary Committee of the congress considered that Trades Unionism had good reason to be satisfied with the remarkable success achieved at the General Election. In truth it has ; and not only with the success achieved at the General Election, but (from its point of view) since in the House. For while the new Labour members have fiddled, the formerly sedate members of the Cabinet have danced ; and the louder the music, the more brisk have been their gyrations. The Labour members have felt their power ; and if trouble does not come among them, as it has already more than once threatened to do, they will continue to wield that power in the effort to carry through the programme of Trades Unionism. Extensive as is that programme, as item after item is completed, the inventive faculty of the leaders will find fresh ones to fill the gaps. For there is quite as much insatiableness about Trades Unionism as there is about the more advanced Socialism, now lifted into greater and greater prominence at succeeding congresses. The success at the General Election and the flattery of the Government have, as said, given the Trades Unionists a taste of their power. They like it ; and it is energizing them into making, as opportunity arises, fresh endeavours to add to their parliamentary strength. But though the past few months have been significant, the Trades

Unionists must not over-rate their strength; for after all, as Lord Lindley observed last Thursday, in a well-reasoned article in "The Times," Trades Unionists are but a small proportion of the working men of the country.

Of course, at the congress there was much grumbling and complaining; but there was less of the wild vapourings and threatenings that have characterized many previous assemblies of the kind. After all that the Government have done for Trades Unionism, after all the recession on the part of the Government (at the dictation of the labour members) from deliberate intention, the Trades Unionists are still discontented. The Trades Disputes Bill is to be perfected according to their own ideals before they will leave it; their funds are to be immune from litigation; they are to be allowed to "peacefully picket" (a phrase which obscures a variety of sin); no Compensation Act will be acceptable that does not give the recipient power to commute his pension for a lump sum; compulsory State insurance is asked for; the nationalization of railways, canals, mines, and minerals is demanded, and the easiest part of the business—the drafting of a Bill to carry it into effect—has been entrusted to the Parliamentary Committee; the contribution of the Government from the Treasury of £200,000 to keep the Unemployed Workmen's Act in motion in the coming winter is looked upon with contempt as a sprat almost unworthy of notice; more educational facilities are required for the working class, although the present excellent supply of free rudimentary and almost free technical education is not appreciated; old-age pensions are still in request, and it is believed that a little pressure will induce the Government to early introduce the necessary legislative provision. These are only a few of the flights of the Trade Unionists. Ways and means do not trouble them. Their privilege it is to prefer; other people may interest themselves in finding out how there can be compliance. And these are our would-be legislators! There was not on this occasion so much talk of unemployment—a concession probably to the present Government, rather than a tacit acknowledgment of an improved condition of trade, which, if it had not set in before the Government got to work, would no doubt have been ascribed to them. But, of course, there is still, as there always will be, a certain percentage of unemployed, who owe their position, according to the teachings of their leaders, partly "to science, "with all other easy methods of production, being used to "benefit the few against the interests of the many." This deplorable fallacy has been the incentive to many strikes, and has caused much mischief in industry. Cheaper production increases the power of purchase; and this in turn increases demand. The gas industry would never have been what it is if it had not been for the cheapening of production which permitted of lower prices, and caused a magnificent growth of demand. But while the blessings of cheap gas and light have been carried to the doors of the working classes throughout the country, is the number of men employed in connection with gas supply—taking manufacture and distribution together—less now than it was before machinery was introduced? The only answer is in the negative.

In connection with trades disputes, Mr. Ben Tillett once more tried to get his resolution passed favouring compulsory arbitration; but compulsory arbitration would strike at the very roots of the *raison d'être* of trades unionism. On the other hand, a resolution was passed declaring that no Bill would be satisfactory that did not give complete immunity from litigation to trades union funds. The full extent of what Trades Unionists desire in this matter is evinced by the fact that the Lords' decision in the case of the *Miners' Federation v. Denaby Main Collieries*—that funds of a union cannot be made liable for unauthorized acts of members—does not go far enough. What Trades Unions now want is described by Lord Lindley in his "Times" article as being altogether opposed to legal principles and good sense. Nevertheless, the President of the congress (Mr. Cummings) announced that unionists were determined to fight to the bitter end for the absolute exemption of their funds from litigation. Lord Lindley, in his article, also declares—to put the point briefly—that "peaceful picketing" is but a name for intimidation and coercion by numbers.

Trades unionism would not be what it is if the leaders did not, by persistent word and action, inflame the feeling of hostility on the part of labour towards capital. The President, in his address, urged that "to combat the influence "of self-interested and aggressive capital, the fullest possible unity was desirable; and he knew of no other force "that could wield greater power and influence for good "than the force of Trades Unionism." On the very day that Lord Lindley's article appeared in "The Times," there was published on the same page a communication from Sir George Livesey dealing with the growth of Socialism among the working classes. His corrective for this condition of things is co-partnership; and by supplanting, in the above quoted sentence from Mr. Cumming's address, the words Trades Unionism by Co-partnership, we have exactly expressed the conclusion drawn by Sir George in his letter: "He knew of no other force that could wield greater power "and influence for good than the force of Co-partnership." The possession of property is not the end of its power and influence. The experience in the South of London is that it broadens sympathy among working men and between them and their employers; and it tends to purer lives.

## Progress and Sulphur Restrictions.

In the selection made for special report in the "JOURNAL" of gas companies representative of concerns of varied magnitude is the Harrow and Stanmore; and in the proceedings of the half-yearly meeting held last week, two or three points were presented to which reference may be made. This is one of those companies situated in the outer ring of the suburban undertakings; and year after year almost from its very start, and until recent times, progress has been slow. The very nature of its area—extensive and with scattered population except in the district immediate to the works—gave it at one time a poor connection per mile of main; and the capital that had had to be expended was relatively heavy to the business done. We have pointed just recently to the accelerated speed of the gas business in the suburbs in recent half years, and of the excellence of the outlook. Here at Harrow the opening up of new and fast railway communications, and the building development in the neighbourhood, have borne fruit for the Gas Company; and the enterprise of the Engineer (Mr. J. L. Chapman), with a sympathetic and helpful Board at his back, has expanded with opportunity. The result has been, for such an area, truly remarkable. Last half year, the increased consumption was at the rate of 12½ per cent.; and this was preceded by some equally significant increases. This indicates how far-reaching and how fast is the pace of the development in the suburbs. The consumers in the Harrow district are participating in the prosperity. Reductions of 3d. in the outer area and of 1d. in the central district have been made in the past half year; a further 2d. is coming off all round at Christmas next; and Mr. Chapman—flushed with success—is betimes looking beyond that. The half year sees the advent of full statutory dividends. Two other points. The carbonizing wages are down to 1·64d. per 1000 cubic feet; and this is largely attributed to the inclined retort system. No horizontals are used at the works now; and, in considering the figure, the size of the works must be remembered. It should be an incitement to the introduction of another Joint Bill for the completion of the removal of the sulphur restrictions to learn that the Harrow Gas Company's part of the expense of the Act of last session, under the promoting care of the Gas Companies' Protection Association, was only £12 12s. 3d. Truly a small expenditure for the benefits conferred.

## Revolt of the Crowborough Gas Shareholders.

The hopes of the shareholders of the little Crowborough Gas Company were set a few years since in the direction of a remarkable prosperity; but the results, with a perverseness that will not astonish many people who declined to invest in the concern, have not followed the course marked out for them. Predictions and former expectations are a long, long way from being fulfilled, as the most cursory glance over a report that appears to-day in our "Miscellaneous News" will corroborate. An Advisory Committee of the shareholders are satisfied that the amount paid for the undertaking exceeded its value; and between the Committee and the shareholders at the meeting last Thursday, they appear to have made out a complete case of over-capitalization and inefficiency on the part of the manufacturing plant. The Advisory Committee, however—somewhat hastily it seems to us, and in

direct contradiction to other portions of their report—conclude it by expressing great confidence that, by the exercise of economies and careful management, the undertaking could, at an early date, return a "satisfactory" dividend on its capital. The Directors, in their report, obviously consider that it is their duty to rebut everything the Advisory Committee have said; and the expression of the great confidence of the Advisory Committee as to a satisfactory dividend in the future if work is conducted on economical lines, is not endorsed by the Directors' remark that they think the business is now carried on in the most economical way. As this economical way has only yielded a profit from which the shareholders think it wise merely to take a dividend of 1 per cent., the confidence of the Committee is open to a little suspicion. But what is more, further capital expenditure has to be faced, with a business moving only sluggishly. Now that the shareholders have been awakened to the position of their affairs, they should insist on a complete expert investigation of the concern from the beginning to the present time, including contracts and so forth. Two of the Directors have been displaced by the shareholders, in favour of two others.

### How Not to Increase Income and Capital.

This exposure of the poor condition of the Crowborough Gas Company, reminds us that some time ago, a few remarks were made in the "JOURNAL" regarding a circular from the Water and Gas Securities Exchange, Limited, which gave examples of "how to increase income and capital by investments in progressive water and gas securities." In one of the examples, appeared this over-sanguine line: "By an investment of £450 in Crowborough gas shares increasing from (say) 2 per cent. up to 9 per cent. in fifteen years: Cost £400; approximate interest over fifteen years £370; approximate capital value at end of fifteen years owing to increase of dividends, £900." The dividend declared at the last meeting is 1 per cent.! Those people who "readjust" their investments, who find themselves in Crowborough gas, or other equally "progressive" securities, and who expect to "increase their income and capital" in manner and rate set forth above, ought to have some intelligent person to look after them.

### Gas Supply in Australia.

It is gratifying to see from the reports of the recent meetings of the Metropolitan Gas Company of Melbourne and the Australian Gaslight Company, Sydney (which are published in to-day's issue), that the business of gas supply is in as flourishing a condition in Australia as it is on this side of the world. In Melbourne and Sydney the prepayment meter is exceedingly popular; and the continuous demand for supplies on this system has kept both the Companies busy. In fact, the former Company, at any rate, find that it is at present impossible to keep pace with the growing list of applicants. The Chairman of the Melbourne Company, in the course of his speech, detailed at some length the steps that had been taken to secure a closer supervision over the wants and requirements of the consumers, by which means they have succeeded in putting themselves on very much better terms with gas users than has ever previously been the case. The greatest trouble here, as elsewhere, is found to be with defective and bad fittings, which are accountable for a large proportion of the complaints made of unsatisfactory gas supply. The receipts from the sale of gas at Melbourne during the past half year show a material increase; while the returns from residuals remain about the same. The Chairman was able to announce that application is being made to the Privy Council for leave to appeal to that tribunal against the decision of the High Court (which was adverse to the Company) in the dispute with the City Council as to their methods of charging for electricity. This is a matter which will be watched with interest by the proprietors, more especially as the first judgment (by the Full Court) was in the Company's favour. In regard to the Australian Gaslight Company, the Chairman was in a position to state that the operations during the past half year have been satisfactory; there having been additional business in respect of sales of gas, and also more favourable prices for residuals. The Arbitration Act, which has increased the wages of the men, is responsible for a slight rise in the expenditure. It is interesting to note that the day consumption has now reached 44 per cent. of the total output.

## GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 716.)

BUSINESS on the Stock Exchange has been much restricted during the past week, owing to the continued demand for gold for the United States, and the fear that the Bank of England will be forced to advance the official rate of discount. Government and other active gilt-edged stocks are lower; but Colonials have maintained their values. Money has been extremely easy; day-to-day advances being at times unlendable at 1 per cent., and weekly loans obtainable at 2 per cent. Discount rates are very firm at $3\frac{1}{2}$ per cent. for three months, owing to the large withdrawals of gold from the Bank of England. Business in the Gas Market has been very quiet. The only show of activity was in Gaslight and Coke ordinary, which, however, is unaltered in value. The tone throughout has been firm; the only declines in the few changes recorded being $\frac{1}{8}$ in Primitiva preferred and 1 in West Ham debentures. South Metropolitan, Wandsworth "B" and "C" stocks, Imperial Continental, and Primitiva debentures are the stocks marking advances. The dealings in Gaslight and Coke ordinary were very numerous—as many as nine different prices being recorded on one day, ranging from $99\frac{1}{2}$ up to $99\frac{7}{8}$; but business was recorded as low as 99 and $98\frac{7}{8}$, and as high as 100. The maximum $3\frac{1}{2}$ per cent. was dealt in at 88, $88\frac{1}{4}$, and as high as 89; while the preference changed hands at $109\frac{1}{2}$, and the debentures at 86, $87\frac{1}{2}$, and 87. South Metropolitan was very firm; transactions being recorded at $132\frac{1}{2}$, 133, and $133\frac{1}{2}$, and in the debenture stock at $86\frac{1}{2}$. Commercial was idle and unaltered in value. In the Suburban and Provincial groups, South Suburban stock changed hands at $123\frac{1}{2}$ and $124\frac{1}{2}$, and Brentford at 262 and $263\frac{1}{2}$. Business was also done in Brighton at 236, and British at 42, the dividend announcement by the latter Company—which is the same as last year—having had no influence upon the stock. In the Continental companies, Imperial has been in request; for after business was recorded at $185\frac{1}{2}$, the market advanced step by step until dealings were recorded on Saturday last at 190—the rise during the week being 2. There was not much doing in Continental Union; but it changed hands at 123 and $125\frac{1}{2}$. European £7 10s. paid found buyers at $18\frac{3}{4}$. As regards undertakings in the remoter world, there has been very little doing; the most activity being in River Plate, which marked $12\frac{15}{16}$ several times, dealings being also recorded at $12\frac{25}{32}$ and $12\frac{13}{16}$. Buenos Ayres changed hands at 97, and Monte Video at $11\frac{1}{4}$. A little inquiry was reported for Primitiva, which marked $7\frac{1}{32}$ and $7\frac{1}{16}$, and the debentures 98; but the preference shares were offered and declined $\frac{1}{8}$ to 5 to $5\frac{1}{4}$, business being recorded at $5\frac{1}{8}$ and $5\frac{1}{4}$.

The closing prices are shown in our Stock and Share List on page 716.

## ELECTRIC LIGHTING MEMORANDA.

**The Criterion of Successful Municipal Trading—Charges for Power Purposes—Sir George Livesey and "The Times"—The Dissolution of an Electric Light Committee.**

POPLAR does not stand for all that is good and pure in connection with local administration; but if the borough councillors want to have some common-sense views on equitable charging for the supply of energy by municipal electricity undertakings, they have only to turn for it to their own Electrical Engineer (Mr. J. Horace Bowden) and his Managerial Assistant (Mr. Fred Tait). These gentlemen are the joint authors of an article on the subject in the "Electrical Review;" and though their plans for charging may not meet with general acceptance, they at least show that, in outlining them, they are animated by root principles of a correct order. There is one point at the opening of the communication with which we totally disagree. The authors say that "a few years ago the criterion of success was the financial result of each year's trading; but, happily, most municipalities recognize the fallacy of this—a large surplus being an indication of doubtful management from the ratepayers' point of view." Would that this were true! Messrs. Bowden and Tait have jointly and individually, it is obvious, taken a very restricted view of the municipal realm to have arrived at this conclusion. We invite them to take a turn up and down the country among the municipal gas undertakings, learn of the thousands upon thousands that are annually drawn from the gas profits "in aid of the rates," and hear somewhat of the petulance and complaining that there is when profits fall short of what councillors think they should be. They will then recognize that there is something a little wrong about their generous ideas as to what are the views on the subject of surpluses of the major number of municipalities. The fact of the matter is that there are not many municipal electricity undertakings running where they can make, do what the administrations will, anything like substantial profit; and exigent competition will not allow them to rest, and gather in a greater golden harvest. But Messrs. Bowden and Tait may take it from us that municipal gas undertakings are not permitted to get off any the lighter in consequence. It would indeed be a happy thing for many a municipal gas concern if the criterion of success was solely low price, and not big profits; but it would be an extremely bad thing for those responsible for the electricity department, as they would find the still lower gas

prices anything but conducive to the good health of their own undertaking. However, our authors from Poplar are found to be in possession of sound business principles, which unfortunately are deemed heretical in most municipal circles. They advise that the tariff of charges should be fixed annually upon estimates of income and expenditure, and all balances (whether debit or credit) should be carried forward. Furthermore, it should be the policy of the management of every municipal undertaking to provide a sufficient annual sum to adequately depreciate existing plant, in order to supersede all antiquated units, and so keep up the standard of efficiency. This sum should be included in the annual estimates, and treated as a standing charge upon the undertaking. Well spoken; and when municipalities so recognize throughout their financial policy in connection with their trading undertakings, we may expect less prodigality, and a kind of millennium in local administration.

Getting, however, into touch with the real point of the article, in considering an estimate of income and expenditure, the load is divided into three general headings—(1) Power and heating, (2) private lighting, and (3) public lighting—and the maximum load demanded is divided in a similar manner. Then, say the authors, the average price charged for each general class of supply should be: As the total maximum demand is to the maximum demand for each class, so is the total of the standing charges, *plus* running costs. As an example, the hypothetical case is given of an undertaking with an outstanding capital of £250,000 and a plant capacity of 4000 kilowatts, and with a maximum demand of 2000 kilowatts, of which 1000 kilowatts is for power, &c., 800 kilowatts for private lighting, and 200 kilowatts for public lighting. Taking these bases, an estimate of a magnitude that forbids brief treatment is worked out; the conclusion being drawn that, allowing ample margin for contingencies, it would be financially safe to arrange a scale of charges for each general class of load to produce an average price for power at 1½d. per unit, private lighting at 3d. per unit, and public lighting at 1¼d. per unit. This significant statement follows: "Any undertaking running under the conditions stated, and charging less than an average price of 1½d. per unit for power, is doing so at the expense of private and public lighting." But how many authorities at the present time, working on less favourable conditions than the example, are charging for power a maximum price of 1d. per unit, without being able to make any logical defence on behalf of the arbitrarily imposed limit? Prices other than for private lighting are fixed upon with a light-hearted liberty that would be ridiculed in ordinary commercial transactions.

Messrs. Bowden and Tait, however, do not suggest that it is not judicious to offer a less rate than the foregoing in order to induce a power load; but they urge that the fact should always be borne in mind that the rate offered should not be below that which would be profitable when the plant and mains are loaded up to the maximum. The authors take a second example for the purpose of ascertaining the minimum charge for power—the basis of their calculations being a 3000-kilowatt maximum demand (being the limit with safety to leave a 1000 kilowatt set in reserve), 1500 kilowatts of which is for power, &c., 1200 kilowatts for private lighting, and 300 kilowatts for public lighting. In this case their calculations, allowing for contingencies, produce this scale of charges, which it is contended, would amply suffice to meet requirements on the conditions they lay down: Power, &c., 1·05d.; private lighting, 2d.; and public lighting, 0·8d. Their allocations of charges to the different classes of custom may be disputed by other professional men; but the only point we want to bring out in connection with their article is the confirmation it affords that a flat-rate of 1d. per unit for power, &c., is not equitable, as either or both the public and private lighting consumers must suffer by it. Equally, it may be argued that the charges they suggest for public lighting are also unjust to the private consumer. Later in the article, the writers advocate for motive power the system of a fixed charge per 50 kilowatts installed, and a low price per unit of electricity consumed. Succeeding this they also submit the judiciousness of classing consumers according to their hours of consumption, and charging different rates ranging from 5d. per unit to 1¼d. Consumers will pray that no more confusion may be introduced into the conduct of the electricity business. But if Messrs. Bowden and Tait's scheme is seriously tried, one of the experiences, we venture to think, will be that the crafty ones among the consumers will soon find means of circumventing the time-basis, and getting placed among the long-hour users at 1¼d. per unit. Of course, the writers' rates are all based on very low costs; and they deny the municipal owner anything in the way of net profit, other than that required for reserves. The contribution—however much one may be disposed to disagree with parts of it—has the merit of instructiveness.

It was at one time thought that the intention of "The Times" in connection with their Engineering Supplement was to take an impartial view of all matters affecting the industry of engineering and its cognates; that the contributions would be "by writers whose influence and authority are everywhere unquestioned;" and that our morning contemporary purposed "to preserve" in relation to the affairs of the engineering industry "that authority with which its name has always been associated in dealing with public matters." That was what was designed; the realization does not flatter the design. In fact, in several ways our contemporary, in the Supplement, falls far short of its own brilliant ideals. Impartial criticism is not a salient point with the writer of the "Notes" in the Supplement when he is called upon to deal with matters affecting the comparative merits of gas and electricity. He sounded the note of partizanship at the time the City Corporation turned from their streets some of the electric arc lamps, and erected in their stead high and normal pressure incandescent gas-lamps. The partizanship also projected itself into notice over the somersault that the Lighting Committee of the Marylebone Borough Council turned in connection with the lighting of Oxford Street, which acrobatic performance produced a decision from the Council favourable to flame arc lamps, together with an extraordinary plan for their disposition. Sir George Livesey communicated with "The Times," and pointed out that he thought the writer of the "Notes" was either rather unfair to gas, or was ignorant of the cause why the Borough Council had decided to use powerful electric flame arc lamps in preference to incandescent gas. Sir George proceeded:

> The reason is given very plainly in the report of an interview with Councillor John Lewis in the "Marylebone Mercury" of Aug. 18 who is reported to have said: "The Electric Supply Committee and the Council undoubtedly made a bad bargain and a serious blunder in paying so large a sum for the undertaking. But it is done, and cannot now be undone. *It is therefore the duty of aldermen and councillors to make the best of it, and do all possible to see that as large a return as possible is obtained.*" The italics are mine. To have given such an important thoroughfare as Oxford Street (which has hitherto been lighted with obsolete flat-flame gas-burners) to incandescent gas would have been a confession of its superiority that the Borough Council could not be expected to face; and they have therefore decided to give the business to their own electricity undertaking. But this is no decision of the case on the merits of the rival illuminants.

The writer of the "Notes," in referring to Sir George's letter, appears to deliberately misconstrue the word "undertaking" as applying to the Oxford Street lighting. Otherwise his diction is defective in transparency. He remarks that the effect of Sir George's argument "would seem to indicate that 'the reason' the Marylebone Council took up electric lighting for street thoroughfares was simply in consequence of the bad bargain they are alleged to have made of the matter." If our view as to misconstruction is correct, then we may add that it is paltry criticism that has to take refuge outside the obviously intended meaning of a correspondent's communication. To the most obtuse understanding, it must be clear that the purchase of the electricity undertaking was the "bad bargain" referred to in Sir George's communication. Another mixture of vagueness and truth is found in the "Note" writer's sentence: "The sickly glare of disintegrating gas mantles, however, is an eyesore to more than the professed electrician." We could comprehend, without any great difficulty, the use of the expressions "sickly glare" and "disintegrating" if electric arc lamp carbons had been the words appearing in the place of "gas mantles;" but we can most cordially agree that gas mantles are an eyesore to more than the professed electrician—for instance, Borough Councils owning electricity undertakings and shareholders in electricity concerns, who compare the value of their holdings and the dividends earned with those of gas shareholders. Perhaps the writer of the "Notes" in the Engineering Supplement of "The Times" is one of those who, having invested money in electricity, has become somewhat soured through disappointment.

[It was the Oxford Street lighting incident that supplied an illustration last week for our editorial article on "The Inequalities of Competition."]

The Local Government Board have not looked favourably upon an electric lighting scheme for Ossett; and the Town Council are about equally divided as to whether or not they ought to persevere in the matter. The Board, having looked into the question, are convinced that a scheme would involve the ratepayers in unnecessary financial difficulty. But there are councillors who pride themselves on thinking that they know their Ossett better than the Local Government Board; and the Ossett they know could support an electricity undertaking. Of course, these sanguine souls have not had experience of electricity supply elsewhere. For the moment, their aspirations are under a cloud, as, by the casting vote of the Mayor, the Electric Lighting Committee has been disbanded.

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**The Gas Question in Paris.**—At their last sitting, the Paris Municipal Council had the gas question before them, but did not advance matters very much. They were satisfied, on the report of M. Desplas, to agree to eventually place the gas-works in the hands of a lessee, but retaining due supervision over them. Our contemporary "Le Gaz" does not, however, consider that the system at present in operation provisionally will be changed next year.

**American Gas-Producer Tests.**—The "Boston Evening Transcript" recently contained some remarks on the producer-gas coal tests which the Geological Survey have been carrying out for some time past. It is stated that the results of these tests will for some purposes put the softest grades of bituminous coal and lignite on an equality in power production with anthracite, and that the efficiency of certain soft coals, when used in gas-producer plant, will be shown to be 2½ times greater than when employed in the ordinary steam-boiler furnace. Other gas tests on peat are also favourably commented on, and will, it is stated, tend to make this a successful competitor with coal.

## TRADES UNION CONGRESS.

### Some Familiar Topics.

THE Trades Union Congress has by now become a time honoured fixture; last week's annual gathering in Liverpool having been the thirty-ninth of its kind. Starting on Monday, and not finishing off till Saturday, the delegates found themselves with no dearth of matter to occupy their attention; and it cannot be said that the proceedings were altogether lacking in excitement. Arrangements were made for the accommodation of close upon 500 delegates; and the President was Mr. D. C. Cummings, of the Boilermakers and Iron and Steel Shipbuilders' Society. Once more the Countess of Warwick was present; and the delegates included, it is said, at least 30 Members of Parliament, and at the lowest calculation 150 members of town, city, and county councils, and other local authorities. The subjects on the *agenda* covered a very wide range indeed; and it is only possible to notice here a few of those which appear to us to have the most direct bearing upon the general labour question. In welcoming the delegates, the Lord Mayor of Liverpool (Alderman J. Ball) remarked that at the present time the Trade Unions affiliated with the Congress numbered over 200, having a total membership of upwards of 1,500,000; and he added that it was to be devoutly hoped that the deliberations of such a body would bring about a more kindly feeling between employers and employed, and so "tend to the establishment of that industrial and political peace upon which the prosperity of the country and the welfare of the working classes so much depends."

After the President had read his address, the Parliamentary Committee's report was considered. This dealt at length with the legislative work of the year; and it opened with the statement that since the Congress last met "the most important events not only of our time, but during the whole of our history, had taken place." Reference was also made to the judgment of the House of Lords in the Denaby Main case, which, it was pointed out, made it clear that the funds of a Union could not be mulcted for the unauthorized acts of members. The action of the Government with regard to the Trades Disputes Bill having been set forth, the satisfactory condition in which the Workmen's Compensation Bill left the Grand Committee on Law was commented upon. Many other matters were, of course, alluded to; and altogether the Committee found cause, in the course of the document, for the expression of a good deal of satisfaction. The report was adopted; and it was thereafter agreed—"That it be an instruction to the Parliamentary Committee to confer with the representatives of the General Federation and the Labour Party, with a view to the issuing of a monthly journal, to be the official organ of the three organizations; the various societies affiliated to the same to be pledged to take not less than five copies for every hundred members, at a charge not exceeding 8s. per hundred copies." A somewhat novel motion, submitted by the representative of the Cigar Makers' Mutual Association, so met with the approval of the meeting that it was carried without a division. It was to urge the adoption by Trade Societies of a label to indicate that the articles produced were made by Trades Unionists, with the object of diminishing the manufacture of sweated and non-Union goods.

A spirited debate arose over a motion by Mr. Ben Tillett with regard to conciliation and arbitration. Mr. Tillett is in favour of this method of settling disputes; and one would have thought, at this time of day, that he might have carried a majority with him. But such was not the case. The resolution he moved was on very much the same lines as that proposed by him last year; and it met with the like fate—rejection. His suggestion was that, in view of the grave national danger to trade and the suffering imposed by lock-outs and strikes, the Congress should heartily affirm the principles of arbitration and conciliation, both voluntary and compulsory, in trade disputes. His motion was that the Parliamentary Committee should be instructed to prepare a Bill embodying conciliation and arbitration as recognized and practised by nations in international disputes; and the concluding part was as follows: "(1) The proposed Bill shall provide a Court, with authority to enforce a contract law making inviolate Union funds. (2) The Court shall determine a minimum wage, and shall have power to punish any infringement of awards by fines, imprisonment, and payment of compensation to the victimized worker. (3) The formation of industrial boards of conciliation and arbitration in all the large industrial centres. Such Committee to undertake on request of parties to a dispute investigation as to data, facts, and cause of disputes, to determine settlement and awards. (4) Courts to be constituted by an equal number of workmen and employers' representatives, the former to be selected under the auspices of the Parliamentary Committee from affiliated membership of the Congress. Where not mutually agreed upon by contending parties, the labour department of the State shall appoint a chairman or referee. (5) The Court shall confine its operations to the affiliated membership of the Congress, and shall be divided in two sections, defining (*a*) voluntary conciliation and arbitration and (*b*) compulsory arbitration. All employees of the State or municipality who shall be organized in a Union shall be eligible for registration under either of these sections, and shall be under no disability as compared with the employees of private firms for the purpose of such conciliation and arbitration. Option to be left to Unions to register under either section." He urged the value of Arbitration Courts as a means of preventing strikes and lock-outs, and recommended the minimum wage clause to the special notice of the miners. The miners, however, did not appear to view the matter in the same light; for on their behalf Mr. W. Brace, M.P., stated with some emphasis that Mr. Tillett could not have more certainly aroused the miners' opposition than by inserting this clause in the resolution. The Miners' Federation held that there was a minimum point in connection with wages with which no arbitration or any other Court ought to interfere. Mr. John Ward, M.P., also thought the Congress would do well to pause before accepting such a "revolutionary proposal." Several other delegates spoke both for and against the motion; and then it was defeated by a large majority.

Mr. D. J. Shackleton, M.P., thought it necessary that the Congress should re-affirm their previous decision, "that no Trades Disputes Bill will be satisfactory which does not secure what was understood as the ante-Taff Vale position, on the basis of the complete immunity of the funds of Trade Unions from litigation;" and he proposed that the Parliamentary Committee should convene a meeting of the whole of the Labour Members, previous to the autumn session, to consider the present Bill as amended in Committee. No dissentient voice was heard in reference to this motion; and it was enthusiastically agreed to.

Subsequently Mr. J. R. Clynes, M.P., of the Gas-Workers and General Labourers' Union, got a motion passed—"That, in view of the present rapidity of production and the continuous introduction of labour and wage saving machinery, and the consequent displacement of manual labour in many industries, this Congress declare in favour of a shortening of the hours of labour to not more than eight hours per day or forty-eight hours per week;" and that this and other proposals should be formulated in a Bill. On the same subject the miners had a special motion all to themselves; Mr. W. Whitefield proposing on their behalf—"That the Parliamentary Committee be instructed to assist the Miners' Federation of Great Britain in obtaining by legal enactment an eight-hour working day from bank to bank, on the lines of the amended Bill which passed its second reading in the House of Commons on May 11 this year." Mr. Whitefield pointed out that for twenty years they had been trying to get this measure through; and in the course of his speech he attacked Mr. Wilson, who spoke in the House against the Bill, as the representative of the Durham miners, who, up to the present time, have, as is well known, been opposed to the principle of a legal eight-hour day.

Another familiar topic appeared in a resolution approving of old-age pensions; and then the Congress, after having rejected Mr. Tillett's motion dealing with arbitration in industrial disputes, "rejoiced" in the prospect of arbitration treaties being concluded between all nations. From which it would almost seem that "what is sauce for the goose" is not "sauce for the gander." Friday's proceedings were enlivened by the refusal on the part of Mr. Smillie, of the Miners' Federation, to obey the chair, which resulted in his being requested to leave the Congress. Then there was the inevitable discussion on workmen's compensation; in the course of which a compulsory State insurance scheme was advocated. The final sitting was devoted mainly to the consideration of matters relating to education; and the delegates then separated, no doubt satisfied with their week's work, which consisted in the disposal of, it is stated, close upon two hundred resolutions.

## Optical Analysis of Industrial Gases.

According to Herr F. Haber, writing in the "Electrochemische Zeitschrift," the refractive power of a gas, or mixture of gases, can be determined with great accuracy by observing the displacement of image which occurs in looking with a telescope at a distant object through a glass prism into which the gas is led. In applying this method to the analyses of gases, the author uses an apparatus (made by Herr Zeiss, of Jena) consisting of a prism telescope, a glass prism for the gas or air, and a mirror. The observer does not look at a distant object, but at a luminous spot situated in the telescope itself. On looking into the instrument, one sees a dark shadow, which falls upon a scale in a position corresponding to the composition of the gas in the prism. The method is simple, and it has the advantage that the refractive index of a sample of gas (as compared with air) remains the same, provided any changes of temperature and pressure affect equally the sample and the air under comparison. If chimney gases be led through the prism, an increase of 0·9 per cent. in the carbon dioxide causes the shadow to be displaced one division on the scale. The instrument can be adapted for photographic registration instead of for direct reading, or the image of the shadow can be made visible at a distance. The apparatus is sensitive to 0·0000003 in the refractive index, corresponding to a change of 0·2 to 0·25 per cent. of carbon dioxide in chimney gases. Methane, hydrogen, hydrochloric acid, and hydrocyanic acid can be determined in air with the same delicacy. In the case of acetylene or sulphuretted hydrogen, the exactitude is twice as great; for sulphur dioxide, two-and-a-half times as great; for pentane and benzene vapour, nearly ten times as great.

It is announced that Sir William Perkin, F.R.S., will leave England shortly for New York, where he will receive public recognition by Americans of the great services which he has rendered to the chemical industry and to science.

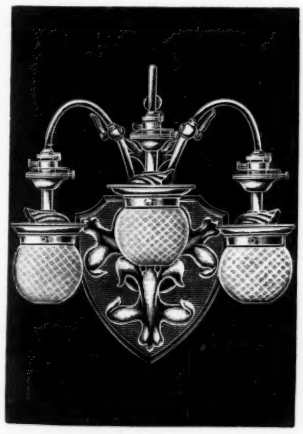
## IMPROVEMENTS IN THE BLAND GAS-BURNER.

EVERY maker of inverted gas-burners is in these days, when this system of lighting is growing steadily in popularity, endeavouring to effect improvement which will give to his particular productions a distinctiveness and superiority above those of his trade competitors. At the new show-rooms of Messrs. Bland and Co., of No. 63, Queen Victoria Street, E.C., it is found that they have been busily occupied in this direction in connection with the "Bland" inverted light, and some very excellent designs and combinations are the result. In the construction of the burner, perhaps one of the most notable changes is the application of a gas-regulating nipple. The nipple is provided with a round gas-outlet; and this is fitted with a triangled graduated pin. As, by the turning of the burner-head, the pin is withdrawn from the outlet, an increased amount of gas is allowed to pass; and, as by the turning downwards of the burner-head, the pin blocks more and more the gas aperture, so the amount of gas passing is reduced. But the pin being a three-sided one and the hole in which it works a round one, it follows there is always a free passage for the gas. Pressure it is said, is not affected, but the quantity is. The arrangement is a simple one; but it is very effective, and admits of fine adjustments being made. Another feature of the Bland lights, it will be remembered, is that the mantle is not attached to the burner in any way; so that no shock can be communicated to it. There has been a modification in this connection; but the result is precisely the same. A metal carrier is now provided which rests on the top of the globe, but is quite independent of the globe carrier and hangs loosely within the globe. With this arrangement, it is a simple operation to put in a new mantle; and mantles may also be depended upon for hanging centrally. Mention of globe carriers, serves to remind one that these are made to take the standard size globes; but the burners known as Nos. 8 and 9 are constructed so as to take a smaller globe, neat and effective, and of any decoration —coloured, opal, or frosted.

**The "Bland" Burner No. 2.**

**The No. 11 Burner.**
(With Top Air Supply only.)

The foregoing are some of the improving details. Among the new burners that the firm are showing is that known as No. 11, which has been designed so that the whole of the air supply is taken in at the top of the burner and none at the bottom of the globe—the object being to have a globe without an under aperture, suitable for church, shop, and billiard-table lighting. It is noticed in this lamp that a greater length of bunsen tube protrudes above the deflecting shell; and, in fact, the whole burner is raised. The result is that, as the point of combustion is higher up in the lamp, and the gallery is larger than in the other forms of the lamp, the air supply is readily drawn in at the top. A bijou form of the Bland light has also been constructed, which has a very tasteful appearance. Bye-passes have also been — and if required pneumatic distance lighters can be—fitted to Nos. 8 and 9 types; and these are found very effective. Messrs. Bland and Co. have now got an exceedingly good selection of burners for all purposes—whether it be for the drawing-room or any other situation down to that for which the less pretentious "Factory" lamp is fitted; and the brackets and pendants they show in conjunction with the lamps are admirably adapted for obtaining the best effect or usefulness as the case may be.



**A Pretty Combination of Bijou Burners.**

It is interesting to add that the "Bland" inverted lamps have been installed in churches—notably, in St. Paul's Church, Woodford Bridge, and in the ancient church at Ross, Herefordshire. Mr. F. Smallbone, of the Chigwell, Loughton, and Woodford Gas Company, says that at the Woodford Church there was a saving of £7·3 effected in the gas bill the first quarter the lamps were used—not a saving that will be despised by church authorities. These are only examples of other installations in public buildings that the firm inform us have been equally successful.

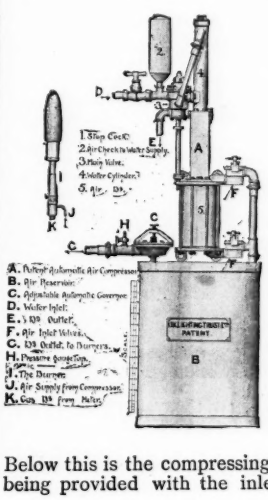
## HIGH-PRESSURE AIR SUPPLY FOR INCANDESCENT GAS LIGHTING.

### A Simple System with Broad Opportunities.

BY a system economical and of peculiar simplicity, the United Kingdom Lighting Trust, Limited, are now offering all the advantages of the high-pressure system of incandescent gas lighting in a field that as yet has been unexplored by it, in which field, in fact, high-pressure lighting has been to a large degree a matter for admiration but of impossibility for various reasons, such as cost, the capacities of plant, and the room required for the accommodation of the apparatus. In this world, small things are most numerous; and it is largely to the small shopkeepers, to public buildings, and to the private consumers who for any purpose require a specially strong light, that the "U. K." high-pressure system will appeal. The Company have chosen an extensive territory in which to operate, and they have done so as it is the territory to which their system is really the most applicable.

Let it then at once be made clear that the United Kingdom Lighting Trust do not claim that their system gives better results than other high-pressure systems; but what they do claim is that it is a system that brings high-pressure gas lighting within the reach of the many, and therefore that it carries forward by a long stride, and by modest means, incandescent lighting in resisting the competition of electric lighting, particularly in the part of the gas business that is most vulnerable at the present time—that is to say in shopland—where intensity of light is frequently the dominating factor. It is true that gas is fast reasserting itself among shopkeepers who discarded it for what to them was a meretricious novelty, but which turned out to be a novelty at a price too great to be compensated by the additional business attracted by the extra light obtained. This new high-pressure gas system will offer another inducement to shopkeepers to refrain from falling victims to the seductions of electric lighting, and to break from it when its expensiveness has proved itself burdensome in daily use. What the "U. K." system offers to such shopkeepers is about double the illuminating power obtained by ordinary incandescent means, at the same price for gas, and a tithe of additional expense for the incidentals—such as water power, small capital charges, and an insignificant amount of wear and tear. In a word, this is a system by which air is compressed by water power, and supplied to specially constructed burners—the only operating part being a small motor, which courts interest by its simplicity, efficiency, and purely automatic action. The cost of installation is, of course, an important point in connection with the introduction of such a system; but about this one there is such an entire absence of complication and such ease of installation, that it comes within the province of any intelligent plumber to do the work by merely following printed instructions. Therefore, the machine being comparatively inexpensive, the labour involved in fixing slight (a couple of joints only being required), the cost of running compo tubing connecting the compressed air to each burner a small matter, and the special burners themselves not a considerable expense, the initial outlay ought to be within the compass of all small shopkeepers and others who require a brilliant light of the kind. Of course, no definite figures can be stated, as the number and illuminating power of the lights required will cause variations in the estimate.

The illustration shows the compact character of the plant. The motor itself is about 6 inches wide and 22 inches high; and if the air-reservoir is added, the whole thing only measures 44 inches in height and 1 foot wide. The motor itself can be placed on a shelf in a convenient position, and the air-reservoir at any distance away; but it will generally be found convenient for the latter to stand on the floor close by the motor. As already indicated, the motor is a model of simplicity; the parts are readily accessible; and the governing arrangements proved to be perfectly satisfactory during an inspection and run of the plant at the Company's office at Thanet House, Strand (opposite the Law Courts). A stop-cock is at the entrance to the motor, and near this is an air-check to the water supply. The main valve adjoins; and through it entrance is obtained to the water cylinder, which is provided with a double-acting piston. Below this is the compressing cylinder and piston; the cylinder being provided with the inlet and outlet valves, at each end



communicating with the air reservoir below. The descent of the piston compresses the air in the air-cylinder, and forces it through the lower outlet valve into the air reservoir, at the same time drawing in a supply of air through the inlet valve at the upper end of the cylinder; while on the up-stroke a further supply of air is drawn in through the inlet valve at the bottom, and the previous supply of air expelled through the outlet valve at the top into the reservoir. From the reservoir the compressed air passes into the distribution system through an adjustable automatic governor, which was arranged at the time of the visit to pass air at 2 lbs. pressure per square inch. The infinitesimal wear and tear that there must be on the motor has been spoken of. Indeed, looking carefully over it, one can only imagine the valves are the likely spots where any can take place; and there it will be almost of a negligible quantity. The valves can be taken to pieces by hand and examined while the lights are going; the only change being the dropping of the lights from high to low pressure. It is found there is nothing more to wear in the valves than the cup-leathers, which can be replaced in a couple of minutes, and the high pressure restored. A great feature is the easy accessibility to all working parts, which can be removed without disjointing the machine. The compressed air is conducted from the reservoir to the burners by small composite tubing.

The burner itself is of interest. At the foot is a gas admission chamber, the top of which is of solid brass. Into this solid brass is screwed the small air admission branch, which leads to a central air-injector, occupying the place of the gas nipple in ordinary incandescent burners. From the gas chamber below, fine gas passages are drilled through the solid head, around the air-injector. Above, the burner is much the same as an ordinary one. There are spacious air-inlets, the bunsen tube is of reduced dimensions, and opens out into a large chamber in the head, and so gives an excellent volume of flame.

At this point, we will go back a little, to emphasize a feature or two. It will have been gathered that, by the simple turning of a water-tap on the service to the motor, the whole arrangement becomes automatic—the little water motor operating as required without further attention. The machine composes itself precisely to the draught on the reservoir; the back-pressure of the latter regulating the whole thing with pleasing exactitude. As additional lights are put on, the operation of the motor is quickened; as lights are turned off, the motor slows down. Again, the governor being set at 2 lbs., any irregularities there may be in the water pressure cannot possibly affect the lights; so that in every way there is automatic control.

An interesting point to the technical inquirer will be the quantity of compressed air supplied to each burner. Photometrical tests, under the conditions prevailing at Thanet House, classify the three sizes of burners used as of 160, 320, and 540 candle power; and the measured figures as to the compressed air supplied to them per hour are respectively 2·9 cubic feet, 4·8 cubic feet, and 9 cubic feet. These figures, it is also noted from the results of tests that follow, bear a variable relation to the gas consumption of the three burners; and it will also be found that the illuminating efficiency per cubic foot of gas consumed also differs. The explanation of this variability would need research, if anyone thinks it worth the trouble. Of course, a large volume of air is also sucked in by the velocity of the compressed air supply, at the ordinary air-inlets of the burner.

As to the efficiencies and consumptions. With the largest burner of the three, an efficiency of 36 candles per cubic foot of gas consumed is obtained, or 540 candles with a consumption of 15 cubic feet of 16-candle gas. With the second sized burner, an efficiency of 34 candles per cubic foot of gas is realized, or 320 candles, with a consumption of 9½ cubic feet of gas. With the smallest sized burner, an efficiency of 26⅔-candle power per cubic foot of gas is achieved, or a total of 160 candles, using 6 cubic feet of gas. Of course, for many situations, a light from one source of 160 candles is ample; but it will be observed that there is a very appreciable loss of efficiency per cubic foot between the largest and the smallest size burner, and yet that of the latter is good, and the effect is very attractive. With the large burner, it will be remarked that the efficiency per cubic foot of gas, when compared with the ordinary incandescent burner, is practically doubled; and this is a point to make clear to consumers when discussing with them the cost of installation. One of these small motors is equal to the supply of compressed air to twenty-eight 160-candle power burners, thirteen 350-candle power ones, or nine of 500-candle power, or combinations of the three sizes.

We have said sufficient to arouse interest in the system for small fields of lighting where strong attractive lights are required. There is nothing about it that suggests any unreliability. If unreliability were suspected, there is the satisfaction of knowing that the ordinary gas-service is not in any way interfered with (the compressed-air system being an auxiliary and not an inherent part). Should any unforeseen difficulty arise, the lighting would simply continue on ordinary pressure. The consumption of water is very small. The objection, too, that water authorities have raised to the use of their water for compressing gas cannot arise in compressing air; and if there is any leakage from this high-pressure system, that leakage is air.

The best has been said for the system here, as it is believed that there is a good field of usefulness for it where more extensive plants are not required, and that it will have an attractiveness where other high-power lamps may not succeed.

## PERSONAL.

Mr. L. W. Nuttall, the Assistant Gas Manager at Keighley, has been appointed to the position of Engineer to the Gosport Gas-Works, rendered vacant by the removal of Mr. W. H. Adams to Bilston.

The Gas Committee of the Warrington Corporation have appointed Mr. Joseph M'Nicholl as Sub-Manager of their Longford Gas-works. Mr. M'Nicholl has been trained in the service of the Sunderland Gas Company, and at present occupies the position of Engineering Assistant to Mr. Charles Dru Drury, the Engineer. He holds first-class honours certificates for "Gas Manufacture" and "Mechanical Engineering" (City and Guilds of London Institute), and also a number of first-class advanced certificates both in "Chemistry" and in "Engineering" (Science and Art Department).

Last Tuesday evening, a representative deputation from the Belfast Corporation Gas-Works waited on Mr. S. N. Stears (one of the Engineers) at his residence, in order to convey to him from the employees an address and presentation on the occasion of his marriage. Mr. John Robinson was called upon to take the chair; and having done so, he requested the Secretary (Mr. Robert Cleland) to read the address, after which Mr. Joseph Kyle made the presentation, and expressed his pleasure at being the medium of conveying the gifts, which consisted of a valuable gold watch for Mr. Stears and a handsome marble clock for Mrs. Stears. Mr. Stears suitably replied, and thanked the deputation for their beautiful present and good wishes towards Mrs. Stears and himself. The deputation were then entertained to a sumptuous repast by Mr. and Mrs. Stears; and a pleasant and enjoyable evening was afterwards spent.

## ESTIMATION OF HIGH TEMPERATURES.

[Communicated.]

It is perhaps difficult to appreciably realize the importance to almost innumerable trade industries which attaches to the accurate measurement of high temperatures. It is only comparatively recently that accurate estimation has been so simplified as to have wide applications, and to render the older methods no longer tenable with the advance of modern progress. We are not in England always as progressive as we might be in modern scientific methods, and sometimes fall lamentably short of Continental nations. Still if we are slow in grasping the full advantage of scientific improvements, an average Englishman has the tenacity of his race in holding on firmly to what his comparatively slow intellect has once grasped as an advantage, more especially when it appeals to his commercial interests.

On the old lines, the estimation of high temperatures was of comparatively crude description—founded on such a system as the expansion of a metal rod immersed in a furnace. An improved method was founded on the specific heat of iron—a known weight of metal after heating being immersed in a measured volume of water, and the rise in temperature noted by an accurate thermometer. Later still (and what is really the foundation of more modern methods) the variation of the conductivity of platinum at varying temperatures to the electric current, as measured by a galvanometer, was employed. This principle has recently been developed and improved. Again, the use of a thermo-electric couple has given rise to further and far-reaching developments.

Ordinary thermometers have their limits—viz., at the extreme a temperature approaching to the boiling point of mercury, or somewhere about 600° Fahr. Moreover, observations are limited to the point of observation, and recording instruments are more or less complicated and possibly unreliable. As a contrast, let us consider methods founded on the conductivity of platinum or platinum-iridium alloys. The principle is that the conductivity to electricity varies with the temperature; and this is applicable to wide ranges.

An old-fashioned thermometer or pyrometer could only be observed at the place where it is in use. The indications of a thermometer on the electric resistance principle can be observed at practically any distance by the readings of a galvanometer, graduated for differences of temperature as indicated by variations in electric current. It is thus possible not only to observe variations of temperature apart from the actual place at which they occur, but (by the use of suitable mechanism with a time-adjustment) to have a record of operations, as a check both on the efficiency of the work and of the workman in charge. The importance of this consideration can scarcely be overrated. There are many industries which require the constant maintenance of proper temperatures—sometimes high, sometimes comparatively low. In all these cases, the newer method of observation and registration is available.

There are, briefly, three types of the modern form of thermometry—viz.: (1) The resistance, founded on the variability in the conductivity of platinum to electric currents at different temperatures. (2) Thermo-electric, founded on the development of current by the action of heat on a thermo-electric couple. (3) The Féry radiation pyrometer, founded on the last-named principle,

but with a special appliance for the focussing of heat and light rays. In the two last types, no battery is required.

The Féry radiation pyrometer allows of observations of the highest known temperatures to be made, and (within certain limits), irrespective of distance. The radiation emanating from a hot body, and which passes out through an observation hole in the wall of a furnace, falls upon a concave mirror and is thus brought to a focus. In this focus is a thermo-electric couple whose temperature is raised by the radiation falling upon it. An adjustment for accurate sighting is provided.

The whole subject of the measurement of high temperature is most interesting and important, and a long article might be devoted to it. To those wishing fuller details on the subject, the perusal of a pamphlet on "Technical Thermometry," issued by the Cambridge Scientific Instrument Company, is recommended.

## THE TESTING OF GAS-ENGINES.

[Communicated.]

The issue of the final report of the Committee appointed by the Institution of Civil Engineers on the "Standards of Efficiency of Internal Combustion Engines" (of which an abstract has lately been given in the "Journal") marks the completion of a useful service. The standards of efficiency recommended by a previous Committee in 1898 for the steam-engine are extended with the necessary modifications to gas-engines, so that both classes may have their working expressed as an "absolute thermal efficiency" and as a "relative efficiency."

Not only does the final report contain valuable information upon the most desirable form of expressing the efficiency ratio for the various ideal standard cycles, but its recommendations are exemplified by application to three gas-engines of graduated dimensions, all, however, operating upon one cycle—viz., the Beau de Rochas or Otto. It is by this putting to the proof of the ratios recommended for adoption that the practical difficulties and limitations of experimental observation are revealed. The task of ascertaining the performance of an internal-combustion motor is a much greater one than with a steam-engine, and it is therefore all the more desirable to know where inaccuracies may lurk, and where approximation may with safety be accepted.

At the very beginning of any comparison, it is necessary to know the quantity and nature of the fluid employed; and this first stage, which relates mainly to the boiler-house in the case of the steam-engine and to the gas-works in the case of the gas-engine, must, of necessity, receive adequate investigation anterior to the expression of the efficiency of the prime mover itself. The examination of the temperature, pressure, and quantity of steam may be regarded as relatively simple, and the variations thereof during a test of small amount; while in the gas-engine an accurate knowledge of the composition of the gas and its heating power are requisite. Should the variation of the composition of the gas be considerable, additional watchfulness will be necessary, and, what is more important, the adjustments in everyday working rendered more difficult. The expression for thermal efficiency devised by the Committee only comes into force after these data as to steam or gas have been supplied, and consequently this limitation must be borne in mind in the interpretation of any results obtained under conditions that may justly be regarded in this respect as ideal.

One of the outstanding observations of the Committee is the great caution which must be exercised in the employment of any figures taken from indicator diagrams; the carefully conducted experiments on the three gas-engines having shown that the brake horse power must be regarded as the ultimate index of the work done by the gas in each case. This being so, when coal-gas—a comparatively uniform fuel—is employed, it would have been instructive to have had analogous figures when producer gas was used in the same engines, and the comparison made also under the variations in quality that occur throughout a working day.

It is regrettable that no accurate means are as yet available for ascertaining the indicated horse power; for, in the present state of knowledge, the ratio known as the mechanical efficiency can only be inferred, or approximated by the comparison of numerous indicator and brake-horse-power tests. Obviously, it is of practical importance how much of any result is due to the efficient action of the working fluid within the cylinder, and how much is wasted by the low mechanical efficiency of the engine. The Committee checked their figures from the indicator diagrams by those from the brake horse power by means of the known waste of power when the engine was running light or empty, and from these smoothed or corrected values determined their final "thermal efficiencies" and their "mechanical efficiencies." While no serious objection can arise from thus stating the final result, it fails to discriminate between the operations within the cylinder and the mechanical transmission to the crank-shaft of the power generated by the working fluid. Compelled by defects in the construction and working of the indicator to adopt the brake horse power as the basis from which to start their calculations, the Committee have assumed that the engine absorbs in friction as much power when doing light work as heavy. Thus obtained, their results may be summarized as follows when using gas of a net or lower calorific value of 564 B.Th.U. per cubic foot, in engines worked nearly at full power, and when operated with a compression ratio of $5\frac{1}{2}$ : 1.

| | | | |
|---|---|---|---|
| Brake horse power | 5·2 | 20·9 | 52·7 |
| Absolute thermal efficiencies | 26·1 | 28·0 | 29·9 per cent. |
| Relative efficiencies | 52·6 | 56·4 | 61·0 ,, ,, |
| Mechanical efficiencies | 83·5 | 84·8 | 86·4 ,, ,, |
| Gas per brake-horse-power-hour | 16·87 | 15·84 | 14·9 cubic feet. |

Attention is directed to the importance of considering the nature of the working fluid, because it is well known that a serious falling off occurs in the power of an engine when fuel gas is substituted for coal gas. Though four to five times as much gas be employed, yet the engine is only able to give out about 85 per cent. of its former capacity in brake horse power. The consequence to the user of power is that he must employ a larger engine, and waste more power in friction, if he is to do the same amount of work as when using coal gas. Where the producer gas was of such a quality as has been mentioned, the following would approximately represent the relative powers to be obtained out of an engine which with coal gas gave 100 indicated horse power.

| | Indicated Horse Power. | Brake Horse Power. | Mechanical Efficiency per Cent. |
|---|---|---|---|
| Worked with coal gas | 100 | 86·4 | 86·4 |
| ,, ,, producer gas | 87 | 73·4 | 84·3 |

It must be understood that the working results of the three engines tested by the Committee are not claimed to represent the high-water mark of gas-engine economy, though they exhibit good consistent working when the relatively small size of engines and the relatively low compression are remembered. It will, however, be instructive to compare them with recent attainments in other directions, and at the same time direct attention to an obvious error in the Committee's preliminary report. They very properly have adopted the lower or net calorific value of a gas for their calculations; but in giving the approximate figures for various gases, they have fallen into the error of ascribing to coke-oven gas about 800 B.Th.U. per cubic foot. The writer ventures to think that one-half this value would be nearer the mark; for, in a series of tests recently made by Herr Meyer upon a 500 nominal horse power engine of the Oechelhaeuser type, the coke-oven gas ranged in calorific value from 350 to 434 B.Th.U. per cubic foot. The indicated and brake horse power were respectively 765 and 628—thus requiring 137 horse power in overcoming the internal friction of the machine, or a mechanical efficiency of 82·13 per cent. The engine worked with a pump for the gas and air supplies; and this, with its comparatively low-class working fluid, combined to bring its mechanical efficiency below that of the National Gas-Engine Company's engine of but one-fifteenth its size.

In the very best modern arrangement of gas-power plants only about 22 to 24 per cent. of the thermal value of the fuel is used; while in the Diesel engine it is claimed that more than 35 per cent. of the value is usefully employed. In these comparisons, the leading place still remains with the Diesel engine; but the explanation is due to its cycle of operations, which hitherto has not been successfully applied when gas is used in place of oil. There appears to be no insuperable difficulty in the adoption of such a cycle, the essential difference of which is set forth in the report under consideration.

The names of the Committee represent men most eminent as chemists, as physicists, and as mechanicians, but not one who can be described as a gas engineer. It is not unreasonable to suggest that the Committee would have been strengthened by the inclusion of a capable representative of the last-named order, with the possible result of making a valuable report still more comprehensive and useful.

## THE WORKMEN'S COMPENSATION BILL, 1906.

By J. Duncan, M.A., LL.B.; Barrister-at-Law.

Gas suppliers were not under the obligations of the Workmen's Compensation Acts, 1897 and 1900, unless there was machinery on the premises worked otherwise than by hand. This was so far as a particular section (149) of the Factory and Workshop Act, 1901, is concerned, which immediately relates to such things—namely, the adapting for sale of any article. But there were other methods of bringing gas-works within the Act. For example, in *Clasper v. Commercial Gas Company* (July 19, 1904), heard at the Bow County Court, there was evidence that there was (2) a mortar-mill within the close, curtilage, and precincts; that there was (3) a building over 30 feet in height being repaired by means of scaffolding; that there was (4) a warehouse containing a large quantity of coal and coke for sale wholesale. The works were also situate by (5) a wharf, but this was not given in evidence—indeed, that the works were a factory was admitted. Whether or not (6) machinery was used for hoisting coal into the retorts cannot be stated. Although there were rails laid around the coal-store when the accident happened, the place was not a railway within the Act; but gas-works might be (7) on, in, or about a railway, more especially if they belonged to the railway company. Gas-works under the present law might also come under the Workmen's Compensation Act, 1897, as (8) engineering

works—namely, any work of construction or alteration or repair of a railroad, harbour, dock, canal, or sewer, including any other work for the construction, alteration, or repair of which machinery driven by steam, water, or other mechanical (*i.e.*, motive) power is used.

The portions of the Acts of Parliament of which the above are illustrations are section 7 of the Workmen's Compensation Act, 1897, including sections 105 and 149 of the Factory and Workshop Act, 1901. All these limitations, conditions, and qualifications have been swept away at "one fell swoop," and, like the Canadian Constitution as contrasted with that of the United States, all accidents which are not excepted are included in the new Bill. In the present Act, only seven employments are within its scope; and in the United States Constitution only nine matters are reserved to the Imperial Legislature. In the new Bill, all workmen, with a few exceptions, are entitled; in the Canadian Constitution, all questions, with a few exceptions, are within the purview of the Imperial Legislature. These alterations will mean an increased payment for premium on the part of gas suppliers; but there does not seem to be what Professor Bain called a "sufficient reason" for increasing the percentage on the policy. We shall presume that the rate for gas-works in 1898 was 25s., and in Scotland 26s. per annum.

Let us now see what the new obligations are. The Bill, which has passed the Committee stage, and now awaits the third reading in the House of Commons, provides for compensation by reason of personal injury by accident to any workman, who is defined as follows:—

"Workman" does not include any person remunerated by salary at a rate exceeding two hundred and fifty pounds a year, or a person whose employ is of a casual nature, and who is employed otherwise than for the purposes of the employer's trade or business, or a member of a police force, or an outworker, or a domestic servant, or a member of the employer's family dwelling in his house, but, save as aforesaid, means any person who has entered into or works under a contract of service or apprenticeship with an employer, whether by way of manual labour, clerical work, or otherwise, and whether the contract is expressed or implied, is oral or is in writing.

The extension of the law is not with regard to more dangerous but less dangerous trades; therefore there is no reason why an increased percentage should be imposed, and much less that it should be submitted to by the suppliers of gas. It is true that the Insurance Companies have cut their rates from 25s. and 26s., and that some of them were for a time in a somewhat precarious condition—throwing off rafts and sheet-anchors to jump on to in case the original boat went down. But it is also true that they have weathered the storm, and that there is no new reason why the present conjuncture should be utilized to increase rates that are already remunerative.

With regard to industrial diseases, with the exception of heat strokes and noxious fumes, there does not seem to be any good reason why the Secretary of State should include gas-works in the list of dangerous trades already listed under section 79 of the Factory and Workshop Act, 1901, to the extent of 24. Still less is it likely that the Committee appointed on the 8th of August, with Dr. T. M. Legge, the Medical Inspector of Factories, as one of the members, will report that there is any industrial disease peculiar to gas-works. This disposes of section 8. There are, however, a few immunities still vouchsafed to the capitalist by a triumphant and democratic Government under a monarchical *régime*. For example, he is not liable for casual employment, only for workmen employed for a fortnight; he is not liable for a workman earning more than £250 a year, nor for any workman whose injury does not last more than three days.

The present law, as enunciated, explicated, and set forth by the House of Lords in *Cooper and Crane v. Wright*—namely, that the employer is liable as well as the undertaker, indirectly if a sub-contractor, but directly if an undertaker—has been explicitly formulated in the Bill. This was rendered necessary after the decision in the Barnet County Court in *Cooper v. Cayford*, that the woodwork in a building contract was merely ancillary and incidental to the business of the undertaker.

Reverting to *Clasper v. Commercial Gas Company*, the Court of Appeal found that the applicant was not in the employment of the Company, but in that of his father, a jobbing slater. Hence he could not recover against the Company, inasmuch as the father was the undertaker. This was a reversal of an inference from the facts, or a reversal of a finding of fact by the Judge of the Bow County Court, that the father was merely a paymaster to find the labour. The law with regard to the joint or several obligations of undertaker, principal contractor, intermediate contractor, and sub-contractor now is that the immediate employer is liable as well as his principal. Gas suppliers can save themselves from liability by employing jobbing builders to do their work, but not if they employ them to find the labour merely. As to their own servants, the only protection consists in insurance. On a wages bill of £1000 a year, the premium will be £10 only.

**London and Southern District Junior Gas Association.**—The following is a list of the officers and Council of this Association elected for the ensuing session: *President*—Mr. W. Upton. *Vice-Presidents*—Messrs. F. Ainsworth and D. Winslow. *Council*—Messrs. W. A. Barnett, L. A. Carpenter, Walter Grafton, W. J. Liberty, H. Rothwell, and P. F. Scarth. *Honorary Secretary and Treasurer*—Mr. J. Clark. *Auditor*—Mr. W. H. Bennett.

## SELENIUM IN THE GAS INDUSTRY.

A recent issue of the "Journal für Gasbeleuchtung" contained a report of a paper on the properties of selenium and its employment in the gas industry which was read some time ago before the Middle Rhenish Association of Gas and Water Engineers by Herr H. Raupp, the Manager of the municipal gas-works at Mayence.

Selenium is very widely distributed in Nature, but occurs only in small quantities. It is chiefly found in combination with such metals as lead, silver, and mercury. When it is present in the copper or iron pyrites that are burnt for the manufacture of sulphuric acid, it collects as an amorphous red powder on the floor of the lead chambers. On fusion, this powder is converted into a black mass like sealing-wax, which is practically a non-conductor of electricity; but if heated above 200° C., it suddenly changes into a metallic modification, melting at 217° C., and having a specific gravity of 4·8. The metallic form of selenium is slate grey in colour, and possesses the curious property of conducting electricity ten times as readily when it is exposed to light as it does when kept in the dark. This change in conductivity allows the substance to be employed in constructing numerous useful pieces of apparatus.

The selenium is generally employed in the form of a "cell"—a pear-shaped vessel of glass, resembling an electric glow lamp, containing a porcelain cylinder round which very fine wires of metallic selenium are wrapped. For certain purposes, the cell is made flat, like a telephone receiver, with a shutter in front of the wires. If such a cell is connected up with an electric bell, a dry battery, and a relay in a suitable manner, the bell will remain silent as long as light falls on the cell, but will ring immediately and as long as the light is cut off. This device may be adopted to give audible warning of the exhaustion of (say) a gas purifier. A selenium cell is so arranged as to be constantly illuminated by a small gas-burner or glow lamp; the rays of light passing through a gas-tight chamber across which a strip of paper treated with lead acetate is caused to travel by means of clockwork. The chamber being placed in communication with the purifier outlet, and the gas passing through it, directly some sulphuretted hydrogen escapes removal the paper is blackened, ceases to be translucent, obscures the light, and at once makes the bell ring.

Instead of employing the change in conductivity of the selenium cell to ring a bell, it may be used to open a gas-cock; and thus the apparatus will light (say) a street gas-lamp fitted with a by-pass directly daylight fails, extinguishing it again in the morning. The cell may be erected on the apex of the lantern, where it will continue to act automatically at sunset and sunrise. By adjusting the relay, the intensity of the (natural) light which brings the cell into operation may be altered in any desired fashion. An arrangement of the same kind has already been used successfully to light and extinguish gas-burners on navigation buoys. The cell may also be fitted to a gas-meter in places where differential rates are charged; thus bringing one train of recording mechanism into action for the day consumption, and replacing it by the other when evening comes.

In conjunction with a dry battery and a galvanometer, the selenium cell has already been employed by Siemens for photometry. The cell is fitted with a trumpet, and carried on a support sliding on the photometer bar. The cell is brought to the normal distance from the standard light, and the deflection of the galvanometer needle is recorded. It is then presented to the light which has to be measured, and moved nearer to or farther away until the same deflection is produced; the illuminating power being estimated as usual from the two distances. This method of photometry is wholly independent of any inequalities in the observer's eyes, or his inability to read the greased paper disc accurately. A more compact form of photometric instrument has been brought out recently, in which the battery and the battery tester are enclosed in the portable case holding the galvanometer. The selenium cell is carried at the head of a vertical support, and is used without any trumpet mouth, so that it becomes available for readings of illuminating power in all directions.

**Gas-Works Directory and Statistics for 1906.**—We have received from Messrs. Hazell, Watson, and Viney, Limited, a copy of the 29th issue of the "Gas-Works Directory and Statistics," which has just been published. It has been revised up to July, and includes a list of Chairmen, Managers, Engineers, and Secretaries, as well as particulars regarding the various Associations of Engineers and Managers. In his preface, the Editor remarks that every effort has been made to bring the volume right up to date, and to give the fullest and most reliable information obtainable; and he points out that in towns where electric light works are in operation, the name of the authority or company owning them is again given. There are, as usual, a few towns the returns with regard to which were received too late for classification; and these are placed at the beginning of the Directory. Acknowledgment is made of the assistance rendered by managers, engineers, and secretaries of the various gas undertakings in supplying the necessary data for the volume.

## INVERTED GAS-LAMPS IN EDINBURGH STREETS.

THE accompanying illustration is the reproduction of a night photograph taken of one of the Edinburgh streets, in which experiments were conducted with lighting by inverted incandescent gas-burners, prior to the determination of a large scheme of lighting on this system. The photograph has lost effect in the

reproduction, and in the printing it does not gain anything. The uniform lighting of the surface of the roadway and pavements is the striking point about the perspective view, notwithstanding that the lamp-standards are not close together, that nothing is gained by reflection from the houses, and that these are burners consuming only 2¼ cubic feet of gas per hour.

## ELECTRICAL CURRENTS AND GAS-MAINS.

A paper on the subject of the destructive action of electrical currents on gas-mains was read by Herr I. Bernauer, of Buda-Pesth, before the last annual meeting of the Austro-Hungarian Association of Gas and Water Engineers. It was recently printed in "Der Gastechniker," the official organ of the Society.

Dealing primarily with the state of affairs existing in Buda-Pesth, and the corrosion of gas and water pipes that has occurred there, Herr Bernauer divides the injuries done to the pipes into two classes, the first being thermal and the second electrolytic attack. Thermal injury takes place where an electric cable is short-circuited in such conditions that the current enters a pipe at one spot, causing so much heat to be evolved that the pipe is locally fused. An accident of this kind occurred in the city early in 1897. A fire broke out one morning in the oak planking of the footway of one of the bridges there. When the flames were extinguished, it was found that the fire had originated through the escape of gas from the 2-inch wrought-iron main crossing the bridge. On examination, a round hole about $\frac{3}{8}$ inch in diameter was discovered at the lower side of the pipe, exactly at the spot where it lay on one of the cast-iron brackets supporting the footway. The pipe was perfectly sound except at the hole, the edges of which showed signs of partial fusion; the same appearance being noticed at the corresponding spot on the supporting bracket. After an exhaustive examination, it turned out that one of the electric tram-cars had come to a standstill close to the bridge, owing to the displacement of its trolley. The collector had slipped sideways, until it made contact between the overhead live wire and the column carrying it (evidences of incipient fusion being noticed at these places also). The current descended through the post to earth; but it was prevented from flowing away because the bridge was built of six iron spans, insulated one from another by the brick piers supporting them. The gas-main crossing the bridge was, however, of necessity a continuous piece of metal, so that the current left the ironwork of the bridge for the pipe, entering it at so circumscribed a spot that it was melted into a hole.

Ordinary electrolytic corrosion of the gas and water pipes was fairly common at Buda-Pesth in the early days. The first electric tramway was opened in 1887, and was fitted with underground conductors. In and after 1893, other lines were brought into use with overhead conductors; and at the close of 1905, the total length of single-line track laid in the city amounted to 172 miles, 45 miles, or 26 per cent., being built on the conduit system. The trams are now chiefly in the hands of two large companies; six other smaller concerns owning the remainder of the service. At the present time, all the return leads consist of insulated armoured cables, well connected with the rails at different places; but originally bare cables, $\frac{3}{8}$ inch diameter, were employed. Before the bare returns were abolished, on one particular stretch of road 600 yards long, leading to the generating station, all the gas-pipes which crossed the road under the bare returns were corroded for a distance of 3 to 6 feet on either side of the cables; becoming so leaky that they had to be renewed one or two years after the tramline was opened, although the portions of the same pipes which lay at greater distances from the cables were thoroughly sound. One particular spot in Buda-Pesth used to give much trouble. A part of the road had been in use for many years as a cab rank, and the soil had in consequence become so heavily charged with saline and acid matter that the insulation of the lighting conductor was always being destroyed in a few months, so that short-circuiting between the conductor and the gas-pipes crossing it was frequent. Finally, the whole of the ground was taken out, and the trench filled with dry sand, which proved a perfect cure.

Some opportunities have arisen in the past for observations upon the different rates at which pipes of different kinds of iron suffer corrosion under the influence of stray currents. Wrought-iron pipes have often been eaten away in a few weeks; the residual metal crumbling like tinder. Cast pipes are not attacked so rapidly; but when they are exposed to the action of the current for longer periods of time, especially where the ground is damp or saline, and encourages electrolysis, they become covered with blisters which break on the least blow. Gradually, too, the cast-iron pipes are perforated. If they lie in dry pure soil, they remain outwardly unaltered, even the asphalte coating appearing uninjured and bright; but the pipes may have become porous and brittle. If the section of such a pipe is examined, alongside the uninjured pale grey crystalline structure will be found greyish black spots which are porous, and so soft that they can be cut out with a knife. On analysis, the spots are shown to be graphitic, containing up to 40 or 50 per cent. more carbon than the uncorroded parts of the same pipes. In the neighbourhood of one of the larger generating stations in Buda-Pesth, a 4-inch cast-iron pipe which had been eaten through for a length of some 40 feet was replaced by a Mannesmann steel pipe coated with asphalte and jute. After two years' time, it was taken up and examined. The outer coating seem uninjured; but on removing it the metal was found to be corroded in many places, and completely perforated in some. Hence, Mannesmann pipe is not competent to withstand the currents permanently.

In the part of Buda-Pesth served by one tramway company, no trouble has arisen during the thirteen years in which the vehicles have been running, except at one spot where there is a street crossing, and where difficulties occur in maintaining good electrical connection between the return conductor and the rails. At this particular place, two pipes laid between the double track have been corroded over a distance of 80 yards. The tramway company have always taken great care to prevent the escape of current—using insulated armoured cables of the same diameter as the outward leads in all the sections of its service, and keeping in excellent condition the electrical joints between the rails. This, says Herr Bernauer, is undoubtedly proof that the proprietors of an electrical tramway system can prevent any harm being done to adjacent pipes through stray earth currents. Moreover, during the past few years, occasion has frequently arisen for the removal of pipes that have lain for eight or ten years close to, or immediately under, the tramrails in different parts of Buda-Pesth. Such pipes have been carefully cleaned and tested, length by length; and some of them have been sawn through. Invariably they were in perfect condition, no sign of electrolytic action being discernible.

These results are at variance with those described by the Electrolysis Commission of the German Association of Gas and Water Engineers, who have met with pipes, dug out of places at considerable distances from the electricity generating stations, which have been severely attacked by stray currents. Herr Bernauer can only explain the unsatisfactory German observations as being due to special circumstances, such as bad electric connections between the rails, the chemical composition of the soil, &c. Nevertheless, whenever pipes lying near to a tramway generating station, or near the rails, have to be taken up, great care should be exercised to investigate their condition, and the fitters and labourers should be instructed to pay special attention to the state of the old pipes which they have to remove. It is also desirable that gas and water engineers, or their Associations, should bring the whole question of electrolytic corrosion of pipes before the municipal or private owners of electric tram systems; for the stray currents do not merely inflict injury upon the property of owners of gas and water undertakings, but the water or gas that is caused to escape from the pipes through their corrosion may do damage to private or public property in the neighbourhood, and in some circumstances may even lead to loss of life.

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Writing in the Aug. 10 number of the "Zeitschrift für angewandte Chemie," Herr Bruno refers to a new process for the manufacture of incandescent gas-mantles. Instead of impregnating a fabric of cotton or ramie with the nitrates of thorium and cerium, the fabric is of artificial silk manufactured by the copper-cellulose process; and it is impregnated with the hydroxides of the rare metals already named. It was discovered that, whereas cotton or ramie impregnated with the hydroxides falls to pieces when burnt, and copper-cellulose does the same, copper cellulose impregnated with the hydroxides holds together well; and it is claimed that the mantle thus made has a better luminosity and is much stronger than other incandescent mantles

# WALES AND MONMOUTHSHIRE DISTRICT INSTITUTION OF GAS ENGINEERS AND MANAGERS.

## General Meeting at Swansea.

The Half-Yearly Meeting was held at the Gas Offices, Swansea, on Wednesday last. At the outset, the Retiring President, Alderman THOMAS CANNING, J.P., of Newport, presided. There was a good attendance, including Mr. R. A. Browning, of Neath (the President-Elect), Mr. E. Jones, of Burslem, the Vice-President, and Mr. Thornton Andrews, of Swansea.

### PRESENTATION TO MR. THORNTON ANDREWS, J.P.

The RETIRING PRESIDENT said that, before proceeding with the regular business of the meeting, he had to perform a duty which of all he had had to discharge during his year of office was one of the most pleasing. The Council and members of the Institution had felt that the occasion should not be allowed to pass without testifying the gratification and satisfaction with which all of them became aware of the fact that Mr. Thornton Andrews, the head of the Swansea Gas-Works, had reached his golden jubilee in the discharge of his duties in that responsible and very arduous capacity; and it had been determined that the Institution should present him with an illuminated address. In making the presentation, he desired to express the great gratification of the members, and at the same time to express their congratulations on his having attained the period of his golden jubilee year. It was very seldom that so distinguished a point was reached in one's career, and it was also exceedingly pleasing for them to be able to note that it had been reached with the observance of dignity and honour in the discharge of his duties. Mr. Thornton Andrews had, during the long period that he had occupied his important position, kept the Swansea Gas-Works thoroughly abreast of the times; so that in 1906 they found them in every way up to date. It was very gratifying to the members to congratulate Mr. Andrews on having accomplished that which was the highest achievement he could reach in being the man of his epoch. They had been especially pleased to see that the Directors of the Swansea Gas Company, who should be the very best judges in the matter, held Mr. Andrews in the esteem and respect that they did, for not only had he shown his great scientific knowledge as an engineer, but he had also shown his capacity by the commercial results of the works. A testimonial had at that time been given to Mr. Andrews by the Directors and employees of the Swansea Gas-Works; and this was well merited, and was proof of the estimation in which he was held. He had long had the honour of Mr. Andrews' acquaintance, and had found him a generous and kindly colleague, always ready to give advice and always desirous of promoting the interests of his brethren in the profession. Outside his own profession, also, Mr. Andrews was held in high regard. On behalf of the members he had the greatest pleasure in presenting to him an illuminated address, and in so doing he would express the hope that he would be spared very many years still in the position he occupied, in good health and continued prosperity. The Chairman handed to Mr. Andrews the address, which was as follows:—

*To* THORNTON ANDREWS, Esq., C.E., J.P.,
Swansea.

Dear Sir,—The members of the Wales and Monmouthshire District Institution of Gas Engineers and Managers, having unanimously decided to hold their meeting in Swansea in the year of your Jubilee as Engineer and Secretary of the Swansea Gaslight Company, feel they cannot allow this unique occasion to pass without presenting you with this address of congratulation.

The untiring energy, ability, and tact which you have displayed in accomplishing the great engineering works you have carried out have been the admiration of the other members of your profession in Wales and Monmouthshire.

The members desire to place on record their congratulations on the marvellous success the Swansea Gas Company has attained under your able management, and wish to convey their best wishes for your future prosperity, and the hope that you will have good health for many years to come.

We remain, on behalf of the subscribers,

THOMAS CANNING, President.
R. A. BROWNING, Senior Vice-President.
EDWARD JONES, Junior Vice-President.
HENRY MORLEY, Hon. Treasurer.
OCTAVIUS THOMAS, Hon. Secretary.

September, 1906.

Mr. THORNTON ANDREWS, who was heartily received, said it would be idle for him to say that he was not aware of the very kind presentation that they were going to make to him in the form of so beautiful an address. He desired to thank them from the bottom of his heart for their kindness. He felt that he should not occupy their time with giving any details of the Company which he had had the pleasure and profit of managing for the last fifty years. He had certainly gone through very many stages in the gas industry; and he was glad to be able to tell them that, after his long term of management, he could look forward with pleasure to the future of the works. Though they were not so large as some companies in Wales, the duties both outside and inside were sufficiently onerous to impress upon him the necessity, in these days of competition, to do the best he could both for the public (the consumers) and for his Company. They had passed through stages of opposition successfully. One drawback was the introduction of incandescent lighting; and this had kept them at a steady rate of decrease, which was only just met by the addition made by the introduction of the coin-meter system. There was no doubt that the loss from incandescent lighting had been modified by the gain to the consumers in the intensity of light resulting; and it had been a source of quieting complaints as to the illuminating power of gas, for incandescent lighting had been a most successful competitor to the electric light. They desired to give to their consumers the best light that could be obtained. Referring to the Swansea Gas-Works, the speaker said that they had installed inclined retorts and the best elevating and conveying machinery with the object of endeavouring to reduce the cost of manufacture. The inclined retorts would be shown to them subsequently; and he trusted they would be both instructed and interested in what they would see. When they were first of all kind enough to name Swansea as the *rendezvous*, he had no idea it was their intention to congratulate him on his jubilee. He therefore felt deeply the kind sentiments which the Chairman had expressed that day—sentiments which Mr. Canning had uttered at a previous meeting when he (Mr. Andrews) had had no opportunity to reply to them. Although these remarks might not be deserved, he was very sensible of their kindness, and of the kindness of members of the Institution generally. The presentation to him that day would be cherished with that which was made to him on June 1, from the officials and employees of the Swansea Gas-Works. He had placed the latter in the adjoining room, as he thought that some of the members might be gratified to see the way in which his Company had shown their kindly feeling towards him. He had always striven to do the best he could, although sometimes suffering from poor health. He trusted he might be spared many years; for although he should not take the prominent part he had done in the past, yet he hoped to remain in harness until the last. He would cherish their presentation as one of the best gifts which they could have presented to him, as it conveyed their kind wishes to him. (Applause.)

### ADDITIONS TO THE ROLL.

The following new members were elected: Andrews, F. G., Swansea; Madden, H. D., Grangetown Gas-Works, Cardiff; Swain, E. H., Pontypridd.

### THE NEW PRESIDENT.

The RETIRING PRESIDENT, on introducing the new President, referred to the kindness and great indulgence that the members had shown to him (the speaker) during his year of office; and it was not right that he should vacate the chair without sincerely thanking them for the honour they did him. For all this, he should always feel grateful and proud. He especially thanked the members of the Council, who had attended the meetings well; and he trusted that they would continue to maintain the same interest in the Institution. He would be glad, as a last word to the members, to say, "Don't be backward in bringing your information here. Don't think anything too small or unimportant." There were no works throughout the kingdom where the gentleman in control had not got some interesting experiences to tell them of. Let them bring them here, and they would be found to be of interest. The speaker appealed to the members to interest the young men in the industry, and to bring them into the Institution. Another point was that he would like to see them interest the directors of gas companies, and corporations and district councils owning gas-works, in their Institution; so that they might receive their support. One effective way in which they might help was by paying the expenses of the managers to come to the meetings. He felt the Institution deserved this, as it was doing all it could to promote the welfare and prosperity of the gas industry throughout the large district which it covered. The great success which had so far attended their Institution was very largely due to the splendid work of Mr. Octavius Thomas, the Hon. Secretary. He had worked out all the details in a manner beyond praise. His next duty was to introduce his successor, Mr. R. A. Browning, of Neath. He was quite sure that in his hands the interests of the Institution were perfectly safe. It was with a sincere desire that he should have a successful year of office that he begged to introduce him, and ask him to take the chair which he (the speaker) now had to vacate.

### THANKS TO RETIRING PRESIDENT.

The PRESIDENT, having taken the chair, said that, as time was short, he had great pleasure in formally proposing a hearty vote of thanks to the Retiring President, who had conducted their proceedings so successfully during the past twelve months.

Mr. E. JONES (Burslem), in seconding the motion, said that never was an Institution launched with better feeling than theirs had been by Mr. Canning. His closing words, in which he referred to the young men joining the Institution, and also the need of interesting corporations and district councils in their Society, were especially worth emphasizing. The Institution were proud of having had Mr. Canning as their first President. He had given them much excellent advice during the past year, and especially

did he remember his most instructive paper on "Incandescent Lighting and Mantles." He trusted that Mr. Canning would long be spared to retain that influence with them which they so much needed.

The motion was carried unanimously.

Mr. CANNING, in returning thanks, said he was pleased indeed if he had been able to be of the slightest service to the Institution.

## THE PRESIDENTIAL ADDRESS.

The PRESIDENT then read his Inaugural Address, as follows.

Gentlemen,—In the first place, allow me to thank you very sincerely for the honour you have conferred upon me by electing me to the position of second President of this our newly-formed Institution. When approached by your Secretary at the formation of the Institution, I was rather dubious as to its being a success. But, knowing the efforts he had made, and that Mr. Canning had consented to be the first President, I felt it my duty to support him; and we all know now how thoroughly he has carried out his important duties in the last twelve months. His efforts have placed the Institution on a sound basis.

It is not my intention to weary you with a long address, as it seems to me to be a difficult task to know what new subject to bring before you, especially after the admirable address from the President of the Institution of Gas Engineers, which is fresh in our memories.

As you are aware, at Neath we have had an installation of the De Brouwer projector, which has now been in operation for over eighteen months.* But, as there are different systems, I will now, as promised, describe the one adopted at Neath. The retort-house to which I specially desire to draw your attention is the one containing the De Brouwer patent coal projector, with its attendant coal breaking, elevating, and conveying machinery. The retort-house is 96 ft. long by 42 ft. 3 in. wide, and contains eight beds of eight single retorts, 10 feet long; the retort-bench being divided between the fifth and sixth beds by the chimney. There is a subway running the whole length of the retort-house, to enable the men to clinker the fires and remove the ashes. Along one side of the retort-house runs the coal store, 10 ft. 3 in. wide, in the centre of which are rails for receiving the railway coal-waggons. The coal is brought on to our siding by the Railway Company, and is hauled into the works by horse traction. It is then unloaded into a large receiving hopper capable of holding 10 tons. Underneath this hopper is fixed a feeder or shaking screen for regulating the supply of coal to the breaker. The small coal is bye-passed direct to the elevator boot, and only the lumps that require breaking are dealt with by the breaker.

The coal is next elevated to a height of 48 feet, and is shot from the elevator buckets into either of two shoots, to be conveyed along the push-plate conveyor into the continuous hopper, which runs the full length of the retort-house. The elevator is arranged as nearly as possible in the centre of the retort-house, and the push-plate conveyor is made to run in either direction. The continuous hopper, which is divided into eight compartments—one to each bed of retorts—is capable of holding 5½ tons of coal, or a total of 44 tons for the eight beds. Each compartment has three outlets, arranged opposite each vertical row of retorts, and worked by hand levers from the floor. The levers for actuating the slide door are cut short, so as not to cause any obstruction, and an extension handle is provided for attaching to them.

Each compartment is fitted underneath with a box, divided into three measuring chambers, placed vertically over each row of retorts, capable of holding a maximum charge of 4 cwt., and fitted with adjustable plates inside for reducing the quantity of coal by ¼ cwt. steps to a minimum of 2½ cwt. The doors are worked by an arrangement of hand levers with a quadrant interlocking gear, so that the top door must be shut before the bottom one begins to open, and *vice versâ*, so that both cannot be open at the same time.

The coal-projector is of the well-known suspended type, similar in all respects to the one first adopted in England by Mr. Ferguson Bell, at Derby, and illustrated in the "JOURNAL OF GAS LIGHTING" for June 14, 1904 (p. 766). The projector is suspended by chains from an overhead travelling carriage. It can be raised, lowered, and adjusted to the various tiers of retorts. The travelling carriage runs upon an overhead double line of flanged steel rails the entire length of the retort-bench.

The whole plant is driven by a Crossley gas-engine of 25 brake horse power, placed in an engine-house outside the coal-store wall. The engine is of the high-speed electricity generating type; and the crank-shaft carries a pulley on one side, from which the power is taken by belts to drive the coal breaker, elevator, and conveyor, while on the other side it is coupled direct, by means of a flexible coupling, to the armature shaft of a 9-kilowatt dynamo. Both the engine and dynamo were put in of sufficient power to drive a discharging-machine in the future, and with some extra power to spare for a capstan. While actually charging coal into the retorts, the projector requires 3½ electric horse power as a maximum; and when running idle between the retorts, 2¼-horse power.

The decision whether to adopt the continuous hopper overhead, or simply have measuring chambers, or a central hopper supply, depends upon several factors, such as the way the coal is brought into the stores, the number of beds in the retort-house, the arrangement of the work in shifts, and the money at one's disposal. Generally speaking, it is a great convenience to have capacity for twenty-four hours' supply overhead. In such cases, any small repairs to the elevating plant can be carried out without disturbing anything. The plant, therefore, will get much more regular attention, and will not be driven to the point of breakdown before necessary adjustments are undertaken, therefore prolonging its life and making for economy in upkeep.

Now for the results in the practical working of this system. Most of you are aware that in South Wales the Gas Workers' Union imposed on a few gas-works—Neath included—an eight-hour shift, 5s. per day, time-and-a-half for Sundays, and only 1 ton 14 cwt. of coal carbonized per man. This went on for some time, with the result that a serious increase took place in wages for carbonizing; and my Committee ultimately agreed that they were not getting a fair day's work for a fair day's pay, and also that the state of matters was not conducive to the interest of the ratepayers. To come to the point, the Mayor and the Chairman of the Committee visited Derby. There they saw the same type of machine at work on through retorts; and they were so struck with its simplicity and effectiveness that they reported favourably to the Council, and it was adopted unanimously.

For the year 1904, with hand stoking and 1 ton 14 cwt. per man, the cost of wages for carbonizing worked out at 3s. 7·75d. per ton. This, as every practical man in the gas industry will see, was most exorbitant; and but for this my Committee would not have troubled with machinery.

In my first report, I estimated that the saving would be about 1s. 10d. per ton, as follows:—

*Estimated Cost of Carbonizing per Ton.*

| | s. | d. |
|---|---|---|
| Wages | 1 | 4·5 |
| Gas for power | 0 | 0·3 |
| Maintenance, repairs, oil, and waste | 0 | 1·5 |
| Interest and sinking fund | 0 | 2·8 |
| Total | 1 | 9·1 |

This I considered fair and reasonable. But man proposes and the Gas Workers' Union disposes. The stokers refused to carry out my instructions; and, after various concessions made by my Council, the result for the year ended March last was only as follows:—

*Actual Cost of Carbonizing per Ton.*

| | s. | d. |
|---|---|---|
| Wages | 2 | 2·48 |
| Gas for power | 0 | 1·00 |
| Repairs, oil and waste, and maintenance | 0 | 0·23 |
| Total | 2 | 3·71 |
| Hand charging | 3 | 7·71 |
| De Brouwer projector | 2 | 3 71 |
| A saving per ton of | 1 | 4·00 |

I have not included interest or sinking fund, as we have practically paid the cost of the machine out of profits.

The installation was started in January, 1905, and has been working continuously ever since, and without any interference with the usual time of charging the retorts. Up to the end of August, it has projected about 15,600 tons of coal without any renewals to the belting or any part of the machinery; and the india-rubber belting looks as if it would project another 15,000 tons without being repaired.

It will tackle any coal, large or small, wet or dry; and the charging of 3½ cwt. of coal takes about ten seconds. In justice to the De Brouwer projector, I must say that I consider it is not allowed to do what it ought to do at Neath, in comparison with what it does at other gas works where it has been adopted, as we ought to save at least 6d. per ton more. But I suppose we must be thankful for small mercies.

Without going into the merits or demerits of the different types of stoking machinery, I think you will agree that we have chosen the right one at Neath. The results would be more favourable if we had a drawing-machine.

Before leaving this subject, I wish to say that I am much indebted to Mr. Ferguson Bell, of Derby, for the practical information he has given me from time to time. A man must have plenty of pluck to start a new system in this country, as there are always a number of wiseacres ready to condemn any innovation. At the Derby Gas-Works there are six through beds of eights (regenerator settings), worked by one De Brouwer projector and one pusher; and the overage cost of working for a twelvemonth was 11·75d., including pipe-jumping. This result, I consider, will take a lot of beating.

Having received many inquiries from time to time as to the working of our spiral-guided gasholder, I thought it would be of interest to you to know my experience. I believe I was one of the first in South Wales to adopt a spiral-guided gasholder; for it is now eight years since I constructed a telescopic gasholder, 100 feet diameter and 25 feet deep, contained in a steel tank. Up to that time only two larger ones were in operation. I adopted the then newly-introduced spiral plates, and owing to a difficult site, where the water flowed from the canal and river, and abutting on a railway and sulphate works, I decided upon a steel tank, which was sunk into the ground for about half its depth.

* See "JOURNAL," Vol. LXXXIX., p. 635.

When full, the gasholder stands upwards of 60 feet above the ground; and some of my friends considered I was taking risks, seeing that we are exposed to the full force of the Bristol Channel gales. I am, however, pleased to say I have never had a moment's anxiety regarding the holder since its erection, although during this period we have experienced unusually heavy gales. I have had to throw my telescopic guide-framed holder, 90 feet diameter, out of action in two instances during these storms, owing to excessive oscillation, whereas the spiral-guided holder has been quite steady.

I observed in the "JOURNAL OF GAS LIGHTING" some months since an account of a further patent that appears to meet the only objection I can raise against the columnless holder.* My works are situated in a busy district, and a good deal of soot and other deposit is thrown upon the crown of the holder. This washes over the sides, and as part of the side-sheeting is protected by the guides, it gives the gasholder a streaky appearance. The patent I refer to obviates this, for the upper row of side sheets is carried up 3 or 4 inches above the curb, and openings are provided in this ring opposite each spiral rail, down which the water from the crown is conducted—keeping the holder clean and of even appearance throughout. When you observe the bad effect this rain water from the crown has upon the appearance of the side sheets, it occurs to me that, even for ordinary holders, it would pay to adopt this plan. However, my experience of this holder is such that I have recommended it for other gas-works in the vicinity, which is a course I should not have taken had not my own given me every satisfaction.

My Council lately negotiated the purchase of some land adjoining the works, and this has enabled me to carry out extensions contemplated for some years. In addition to a scrubber, we have just completed four of Green's type of purifiers for oxide. I have introduced the gas at the centre, using two layers of oxide 8 inches thick, and the gas passes upwards and downwards through the material. From the reduced pressure, owing to the slow passage of the gas, I obtain much longer active work from each box, which must necessarily increase the sulphur impurities in the oxide, and save labour both in emptying and revivifying. I have not had this system in operation long enough to give you tabulated results, but I may do so at another meeting. I can say, however, that my cost of purification will be reduced about one-half on the previous year's charges.

No doubt it will be a surprise to most people in the gas world to learn that we have had for some years past gas-driven cars running successfully in Neath, and I will at once give you a brief description of them.† The gas-motor cars are self-contained, and they are of the ordinary type of car, with garden seats, in general use in this country. All machinery is enclosed and concealed from sight, clean in working, and causes no nuisance from vibration, heat, or smell. This latter point has been successfully accomplished by the introduction of a special and patented lubricating arrangement, whereby the disagreeable odour attending all gas-engines is prevented.

The motor is a double-cylinder gas-engine, 15-horse power, of the Otto model, and is so arranged that all parts can be easily reached for the purpose of oiling, cleaning, and repairs. While the car is on the road, the engine is kept in motion, and is completely under the control of the driver, who can reverse the car, at will, or, by adjusting the driving-gear, reduce the speed from eight miles per hour (the maximum that is allowed by the Board of Trade) to one mile per hour, or less, as the exigencies of the traffic may require. This is a point of considerable importance, as it provides the means for the ascent of gradients such as may be met with in any ordinary tramway lines, and also permits the car to be well within control in crowded thoroughfares, or while taking points.

The gas supply for the motor is drawn from the town mains. It is compressed to about eight atmospheres, and then delivered by an ordinary india-rubber tube to the car, where it is stored in reservoirs underneath, containing, when fully charged, 300 cubic feet of gas, or sufficient to enable the car to travel about eight miles without any risk of the charge being exhausted during the journey. The refilling of the receivers usually takes about 1½ minutes, and it may be arranged for at any convenient point on the line where a compressing plant can be erected.

The original tramways at Neath, owned by a company and worked by horse traction, got into difficulties, so that the Corporation were compelled (in 1897) to acquire them in the interest of the town and district. After several reports on the different systems from the Borough Surveyor and myself, a Special Committee of the Council visited Blackpool, where they saw the gas cars loaded with passengers running up gradients of 1 in 30 and 1 in 35, and going round curves almost at right angles. We rode on well-designed and comfortable cars, both inside and out, and, in our opinion, nothing was objectionable. The motor-cars were much superior to horse cars. So my Council decided to adopt this system. The Manager at Blackpool at the time informed me that his Company were so pleased with the results that they had ordered an additional twenty cars in readiness for the next season, and that the cause of their being discontinued was due to the difficulties they had with the Gas Traction Company as to agreements.

* See Vol. XCII., p. 689.

† The matter was referred to in the "JOURNAL" for Sept. 5, 1899, p. 589.—ED. J. G. L.

I am indebted to the General Manager at Neath for the following results per car-mile:—

| | |
|---|---|
| Gas at 3s. per 1000 cubic feet, including compression, lighting of cars, and depôt | 1·80d. |
| Repairs, renewals of plant, including fitters' time | 1·10 |
| Drivers | 1·23 |
| Conductors | 0·75 |
| Labourers | 0·50 |
| Management | 0·58 |
| Painting | 0·45 |
| Stores | 0·35 |
| Oil and waste | 0·16 |
| Rent | 3·60 |
| Rates and taxes, fire insurance, employers' liabilities, and third-party insurance | 0·81 |
| The total cost per car-mile being | 11·33d. |

These figures speak for themselves. Our track is a fairly level one. We have a gradient in the district of 1 in 22; but, in my opinion, if 20-horse motors were substituted for those of 15-horse power now in use, the extra weight would not exceed 2 cwt., and they would easily negotiate any but extraordinary gradients.

When first the motor-cars started, a number of passengers complained of the smell and vibration. Not having a practical working engineer to superintend, the motors were in the hands of the Manager of the horse traction, who, as would be expected, knew more about a horse than a gas-engine. But when the practical man took charge, most of the complaints were removed. The cause of the smell was mostly due to the water in the coolers not being changed more often, which made the oil hot. With a new system of ventilation in the engine-room, there is nothing now that any but a very fastidious person could complain of.

Mr. THORNTON ANDREWS, in moving a vote of thanks, said the cost for carbonizing at Neath struck him as being very low, especially for the system that they adopted, for they had no inclined retorts, &c. As regards the items charged to carbonizing, he wished that engineers would promote as far as possible one uniform description of the labour that they included under the head of carbonizing. Views as to what should be included under this head were widely divergent; and until they knew what description of labour constituted carbonizing, it was almost impossible to draw proper comparisons between the results that were attained. One said he could do it for 1s.; another 1s. 6d., or even more. It should be properly defined what was the actual standard of labour, and what it constituted; where it should begin, and where it should end. He felt deeply on this point, as some people with inclined retorts claimed that they could carbonize at 1s. 1d. per ton. He found he could not do a fair trial under 1s. 5½d. per ton. This difference was probably due to the want of a uniform method of reckoning the "cost of labour." The engaging of an extra bricklayer made a difference of from ¾d. to 1¼d. per ton. If gas engineers were to take up this point and get a uniform definition, it would be of very great help to them. He thought their cost of carbonizing was extremely good. It had been stated that at Derby the cost was under 1s. He would like to see the particulars of this. He was jealous, because it cost them 1s. 5d. at Swansea. Reference had been made to spiral gasholders, which recalled an old friend of his who was, he believed, the originator of the first spiral gasholder used.

Mr. CANNING, in seconding the motion, said they had had a very practical address; and if it had had no other result than inducing Mr. Andrews to speak to them, its delivery would have been fully justified.

The resolution was adopted.

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Mr. WALTER LISTER (Godalming) read the following paper.

## A DUST PREVENTER FOR PUBLIC ROADS.

The dust nuisance on our public roads has been, and still is, a topic of much conversation; but up to now there has been little done to cope with it, and complaints are daily received from all parts of the country, inasmuch as our motor traffic is ever-increasing. We have almost struggled through another season of dust to find that nothing permanent has been decided upon to alleviate this public malady.

In many places, all kinds of materials and liquids have been experimented with, in the hope of finding out the best and cheapest way to obviate the nuisance—including "Westrumite," "Akonia," slag-tar macadam, &c.; and they all seem to work out too expensively to be undertaken for a general system of dust prevention. In my opinion, the time is now opportune for the doing of something permanent; and I venture to suggest the adoption of coal tar, which, if properly applied to the greater part of our roads used for motor traffic, would prove in the long run to be cheaper and more efficient than any other remedy yet tried.

I have no doubt that slag-tar macadam, applied at Battersea, has proved one of the best remedies; but its cost, and the amount of time required to cover the many miles of roads, put it out of court. Then why not take the simplest and cheapest remedy—viz., the application of tar paint to our main roads? By this means all the principal roads could be dealt with so as to last through the season, at a cost not exceeding £45 per mile, and without interfering with the traffic.

I have seen sections of road treated in this manner. It gives a smooth surface, and the coating prevents the suction power of

the motor tyres from lifting out and depositing grit all along the road. The absence of dust is obvious; and during wet weather mud is conspicuous by its absence. This is bound to give a longer life to the macadam road; and the road will last from six to seven months without showing signs of breaking the crust formed by the application of the tar. The work should be done in hot and dry weather, while the surface of the road is warm; and half the road should be taken at a time.

To carry out this system of tar-painting, one portable tank, fitted with fire-box, flue, and smoke stack, and tar brought up to boiling point, is required. After the roads are swept clean of all dust and grit, the tar should be run off into smaller tanks with 1-inch flexible tube attached, with a 2-inch cross spray. It should be put on the roads as hot as possible, and labourers should use brooms to brush the tar over the road. After about eight hours, it will be found to have penetrated into the macadam to the depth of at least 2 inches.

It will be found that the portion of the roadway thus done will be available for traffic in the course of about twelve hours. Sand or dust from the road might be spread over where necessary, but only in small quantities, as this tends to eat up the tar, which should penetrate into the road.

I have had a portion of road, 1 mile long and 21 feet wide, done in this manner, and find that if the tar is applied hot it will penetrate 2 inches into the macadam. The cost works out as follows:—

| | Amount. | Per Square Yard. |
|---|---|---|
| Price of tar | £20 10 8 | 0·40d. |
| Sweeping | 6 13 5 | 0·13 |
| Hauling and heating tar | 3 1 7 | 0·06 |
| Applying tar | 6 13 5 | 0·13 |
| ,, ,, and cost of sand | 7 14 0 | 0·15 |
| Total | £44 13 1 | 0·87d. |

I take it that, should all the roads on which motors are run be watered to prevent dust, the cost would be, approximately, £10 per mile; and then the roads would not give the requisite satisfaction. Under the system of tar-painting, the results would be durable and less costly. This estimated amount for water may seem a large item; but water is not obtainable as easily through the country as it is near the large towns, and this adds materially to the cost in the form of increased charge for transit.

There has been on the part of many local authorities a gradual progression of ideas towards tar; and the results, consequent upon exhaustive experiments, are satisfactory and intensely encouraging. Nothing has been brought forward as yet to show that this treatment is not desirable, and even the stock argument of climatic conditions will not avail in this instance.

As regards the increased expenditure over the somewhat primitive and undesirable method of watering, I may point out some serious waste caused by this disastrous and stupid system. The water cuts, channels, and washes out the binding, involving the necessity for frequent repair and reconstruction at short intervals, whereas the tar-paint, being dustless, requires no watering, and the initial cost involved is quite inconsiderable. Again, expense is saved in the process of cleaning. The cleaning of an ordinary macadam road is ruinous, whereas with the tarred surface suggested the stones are not torn up or disturbed, and the roads can be swept regularly without the slightest fear of the surveyor's anger, which is so apparent under the old system.

If time permitted, one could say much about the matter from a hygienic point of view. A dissertation on the antiseptic properties of tar, and its use as a germicide, would be out of place here; but its value in this connection cannot be gainsaid.

Tar-painting of roads has now passed out of the region of demonstration and experiment; and I am of opinion that all interested in gas-works would do well to bring this question to the front. The method is certainly the most efficient and economical for dealing with the dust nuisance on a large scale, and its adoption—while it will meet a long-felt want for the public, the pedestrian, and the cyclist—will provide a new and valuable market for coal tar.

*Discussion.*

Mr. Thomas Canning did not think any subject of greater importance in these days could have been brought before them than the question of treating roads with coal tar. All who made use of the roads knew what a nuisance the dust raised by motor-cars was. Great damage was done by the dust; and he could not but think, looking at the matter from a sanitary point of view, that a great deal of mischief must be done by the raising of dust which was often filled with microbes and infectious matter. It did also great injury to gardens and vegetation generally. The question was almost becoming a national nuisance. In saying this, he was not running down motor-cars. He believed that, having come into existence, they had come to stay; and this being so, it was necessary that some steps should be taken to do away with the dust nuisance, and he believed that gas people had it in their hands to remedy the nuisance. Therefore, it became their special duty to point it out with as much intelligence as they could. At the last meeting of the Institution of Gas Engineers in London, Sir George Livesey drew attention to this important use for tar, which was a complete reservoir of a large number of valuable products, and yet to-day the price of coal tar remained what it was fifty years ago. Since the meeting referred to, the "Journal of Gas Lighting" had published certain leading articles containing very useful hints; and he would like to refer particularly to the issue for Aug. 28, in which they would find an article especially dealing with this question well worthy of their attention. Experiments in the treating of roads for the prevention of dust had been carried out in Kent, especially at Folkestone. Here was a town which had been overrun with motor-cars. Gardens had been destroyed and visitors driven away; and the only remedy found was the application of the very remedy which they, as gas engineers, had in their hands. Folkestone, since the time, twelve months ago, when it was started, was quite a different place to what it used to be; to-day it was almost a dustless town. In other parts of the country they had also had experiments made. He had read the evidence before the Motor Car Commission that had been given by Mr. H. P. Maybury, formerly a gas manager and now Surveyor to the Kent County Council, in the course of which he said he was still obliged to employ gas tar, but that it must first pass the distiller. He (the speaker) claimed, however, that this gentleman's experience was too limited under the circumstances to come to an *ipse dixit* opinion like that. There were other ways besides distillation. It was for them to ask themselves, Could they not treat their tar so as to make it acceptable for this purpose? Could they not in their own districts carry out experiments which would show that gas tar was applicable to the purposes which he had mentioned—namely, prevent dust on main roads? Experiments had been made with coal tar; and the results had been different from those given by Mr. Maybury—and that, too, in the county of Glamorgan. At a recent meeting of the Glamorgan Roads and Bridges Committee, Mr. G. A. Phillips, the Deputy County Surveyor, reported on the experiment of tarring a section of 923 yards of the main road at Bridgend for dust laying. The effect, as far as it had been observed during the short period since the work had been done, was considered satisfactory, though it was perhaps early to have any recommendations upon the short experience they had had. But the method certainly presented itself as one of the most efficient and economical ways of dealing with the dust nuisance. The cost had been 0·95d. per yard. In Cambridge, the Council had experimented in a similar way, with satisfactory results. A county road ran through their district; and they offered to treat it with tar for twelve months free of cost to the county if permission were given. Here the cost of treatment was $\frac{7}{8}$d. per yard. They had had various prices given, from 1$\frac{1}{4}$d. down to $\frac{7}{8}$d. It was too early yet to see whether this system was going to go higher or lower; but they had their own ideas that the price might go lower. He said this bearing in mind the possibilities of a machine invented by a very able Frenchman, which covered a lot of ground in a very short space of time. It was being tried; and no doubt a machine of this kind, which spread the finely prepared tar on the road while it was hot, would become a success. It was only a question of time. He felt that this matter was really so important that it should be discussed fully at the meeting. It was for them to make experiments. If they did not mind, the county councils would be purchasing stuff which would spoil the fair fame of coal tar—if it was possible to smirch anything that was already black! He considered that when a good surface was properly put on with coal tar, it would last a considerable time—probably twice as long as any imitation would last; for a tar-treated road required less water, and in some cases none at all. In some towns the cost of watering the roads was very heavy, and in periods of drought there was sometimes great reluctance to water them at all. There were a lot of advantages in the use of coal tar; and it would be to the interest of their business if they made their own experiments, and lost no time about it.

Mr. E. Jones (Burslem) said there was really no subject that was taking the attention of the public at the present time so much. Referring to the article in the "Journal of Gas Lighting" for Aug. 28, to which Mr. Canning had drawn their attention, he (the speaker) thought that some move should be made by the District Institutions to bring the matter before the parent body, and that they should do something like the Sulphate Committee were doing in regard to sulphate. It was difficult for gas managers and engineers to deal with this subject by themselves. There were some with a dual position, and it was easier for them. When he was in that position, he was able to do something in the way of experiments, not so much with keeping down the dust as with maintaining the roads. He had a great fight with the County Council to get a better surface on the road than then existed. The gentleman whose evidence had been referred to said that tar on a road made of limestone was of no use. He had made some experiments; and with regard to what he called coal tar, he said he was still in favour of tar as it came from the gas-works, and he added he would take it from the gas-tar plant, but that he preferred to have it distilled. He mentioned this because he thought that Mr. Canning had slightly misunderstood the point—a thing that Mr. Canning did not often do. He agreed that the subject was of the greatest value. In many country places, property close to the road was beginning to deteriorate because of the dust. The subject was one which he thought they should pursue to the end, and they should do something to show that they had had the matter under their consideration. They should get the parent Society to do something to bring it before the various authorities; they had certainly no right to let the industry slip through their fingers.

Mr. THOMAS CANNING thanked Mr. Jones for his remarks. In the evidence which he had read, it appeared that Mr. Maybury not only preferred distilled gas tar, but also that he said coal tar was useless, as it peeled off. He was glad to hear from the last speaker that in subsequent evidence something quite different had been stated.

Mr. T. ACLAND (Llanelly) said they had had the question before them at Llanelly for 15 years past; and they had some miles of good roadway there. At the present moment, at the request of his Board, he was carrying out some experiments with regard to the distillation of coal tar. He agreed that the subject was one of the greatest importance; and they must do what was necessary to it to get a good price themselves and to supply authorities needing it. He had watched the make-up of several roads in his district. The first and most important thing was to see that the formation of the road was very good and thoroughly solid; then there ought to be a layer of 4 inches of properly-made tar macadam; after this it should be well rolled, and then the tar-painting was all right. When tar-painting was put on a road with an indifferent surface, the tar was wasted; for it had been tried and proved a failure. If it was properly made first, and properly painted afterwards, they would have a splendid road.

On the motion of Mr. OCTAVIUS THOMAS, a hearty vote of thanks was accorded Mr. Lister; and the further discussion of the paper was adjourned.

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Mr. GEORGE T. ANDREWS then read the following paper.

## THE SWANSEA GAS-WORKS.

Before inspecting the works, I purpose giving a short description of the several portions.

### *Carburetted Water-Gas Plant.*

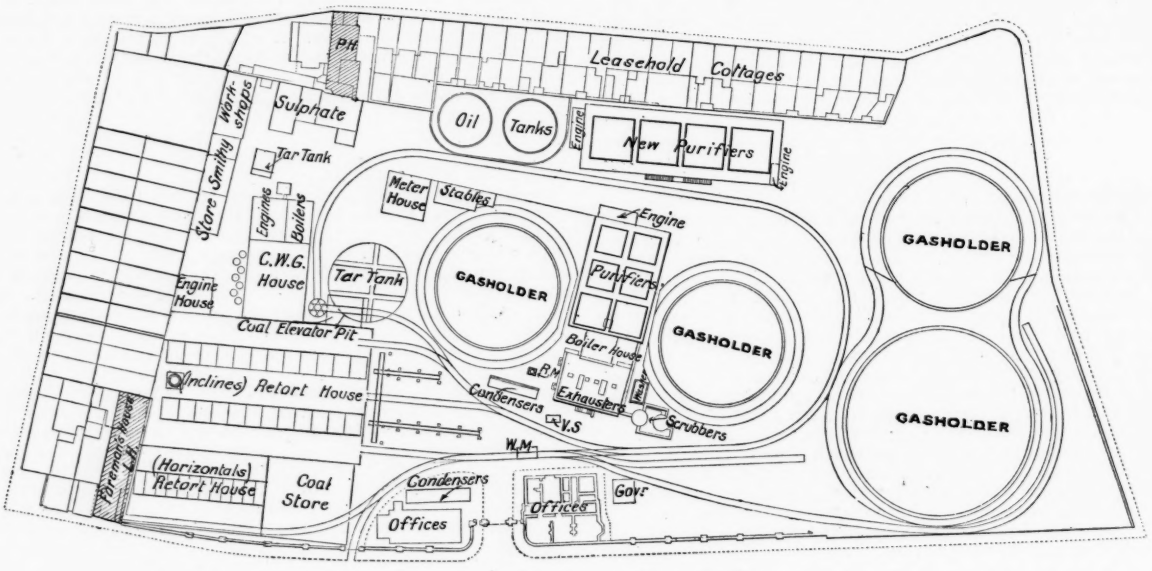
The first instalment, consisting of a duplicate set of generators, carburettors, and superheaters, capable of producing 750,000 cubic feet of gas per diem, two 20-horse power engines, two Babcock and Wilcox boilers, and all necessary oil and water pumps, was put up in 1895. In 1901, a second instalment, consisting of a duplicate set of generators, carburettors, and superheaters, capable of producing a million cubic feet of gas per diem, was erected. The combined plants have therefore the power of producing any quantity of gas ranging from 100,000 to 1,500,000 cubic feet in 24 hours, allowing one set for repairs. The total cost of the plant and house amounted to £16,423 for a maximum production of (say) 300 millions per annum, or £55 per million cubic feet.

### *Retorts.*

Up to the year 1902 there were 196 horizontal retorts available for use, capable of producing 1½ million cubic feet of gas per diem. These were set in beds containing seven 16-inch 20-feet retorts, with the usual direct-fired furnaces, requiring about 30 per cent. of the coke made to heat the retorts. The latter were contained in three retort-houses, each 160 feet long, 40 feet wide, and 40 feet high, covered with galvanized corrugated iron roofs. It was determined to instal inclined retorts with regenerative furnaces and the necessary coal and coke elevating and conveying plant on the most improved principle. In order to carry out this intention, two of the three retort-houses had to be removed, together with eighteen beds of the through retorts.

### *Retort-House for Inclined Retorts.*

The new retort-house consists of a semi-circular open-latticed girder roof, 160 feet long, 103 feet span, and 67 feet high from the ground to the top of the girder rib, with a centre louvre, 10 feet wide and 5 feet high, for ventilation. The whole roof and sides is covered with No. 16 B.W.G. galvanized corrugated iron sheeting. Messrs. Samuel Cutler and Sons were the contractors. The conditions contained in the specification were unusual, as the horizontal beds had to be kept at work while the old retort-houses were being demolished during the erection of the new roof, and




PLAN OF THE SWANSEA GAS-WORKS.

the erection of the inclined retort-beds carried on at the same time. On reference to the photographs, it will be observed that a special gantry was erected, 30 feet high, covering the retort-beds at work. On this gantry the whole of the materials were hoisted, and the girders and principals placed in position. All details of this roof may be seen on the drawings hanging round the room, and a detailed description of the roof has appeared in the "JOURNAL OF GAS LIGHTING" and the "Gas World," and in a paper read by Mr. Samuel Cutler, jun., before the Eastern Counties Gas Association.*

### *Inclined Retorts.*

CONTRACT No. 1.—Twelve beds of inclined retorts, containing eight 20-feet retorts, 20 in. by 15 in., were erected in 1903 by the New Conveyor Company, with all hydraulic and foul mains and valves, superstructure, charging and drawing stages, all fire-brick and furnace work, ironwork, excavations and foundations, and a chimney-stack 100 feet high; also 600 feet of 24-inch wrought-iron gas-main, which gradually reduces the temperature of the gas before it enters the condensers and scrubbers.

CONTRACT No. 2.—The coal elevating and conveying plant, including a double elevator, two 50-horse power gas-engines, driving-gear, and elevator pit.

CONTRACT No. 3.—Hot and cold coke conveyor in yard, elevating and conveying plant, and 28-horse power gas-engine.

* See "JOURNAL," Vol. LXXXIII., p 739.

Regenerative settings of the most improved type have been erected, and the expenditure of fuel has been reduced from 32 to 15 per cent. of the coke made. The cost of carbonizing is about 1s. 5d. per ton of coal; but this includes certain items of labour some engineers do not charge to carbonizing.

The second installation of twelve beds of inclined retorts, precisely similar in all respects to those erected by the New Conveyor Company, have been erected by Drakes Limited; but the engines, coal elevator, and coke conveyor in the yard, as well as the chimney, and excavations and foundations for the beds, were prepared ready for this instalment under the first contract.

| | |
|---|---|
| The joint production per 24 hours of the 24 beds of inclines would be . . . . . | 2,680,000 cubic feet, |
| And the 84 horizontals in No. 3 house . . | 672,000 ,, |
| Making a total of . . . | 3,352,000 cubic feet |

or, allowing 10 per cent. for repairs, a net production of 3 million cubic feet. The former production of 196 horizontal retorts was (less 10 per cent. as before), 1,400,000 cubic feet; leaving a net gain in manufacture of 1,600,000 cubic feet, in the same space as that formerly occupied by the horizontal retorts.

### *Cost of Plant and Retort-House.*

The total cost of plant and house for the 24 beds of inclines, as described, amounts to £40,000 for a maximum production of 480 million cubic feet per annum, or £84 per million.

Cost of inclined beds—

| | | | | |
|---|---|---|---|---|
| First contract . . | £18,000 | | | |
| Second ,, . . | 12,685 | | | |
| | £30,685 / 24 beds | = £1280 per bed / 8 retorts | = | £160 per retort. |
| Cost of house— | | | | |
| Amount of contract | £8624 / 24 beds | = £360 per bed / 8 retorts | = | 45 ,, |
| House, roof, and brick and ironwork per retort complete . . . . . | | | | £205 per retort. |

*Purifiers and Scrubbers.*

The purifiers consist of four, 20 feet square, erected in 1875, with centre-valve arrangement; two 26 feet by 24 feet, erected by Messrs. C. & W. Walker in 1885; and four new purifiers, 30 feet square, with 24-inch valves and connections—together with all elevating machinery necessary for filling the purifiers. They are contained in a spacious brick building open at the front, the purifiers being erected on a stage, with a ground-floor level for the oxide.

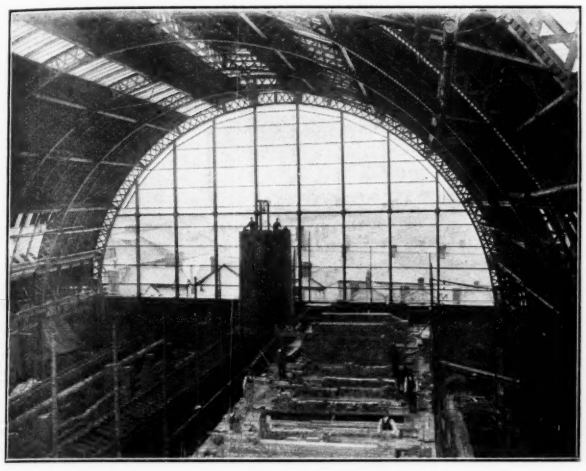
Two scrubbers, 12 feet diameter and 60 feet high, a "Standard" washer, and two sets of condensers, form the condensing and washing plant.

*Make and Storage.*

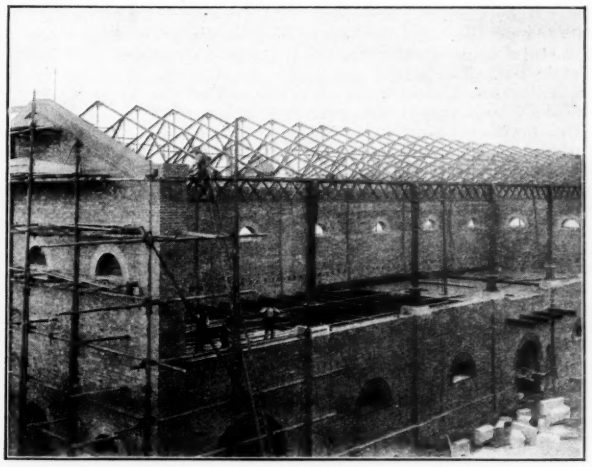
The maximum make of gas during the 24 hours in 1905 was 2 million cubic feet, or 420 millions per annum. There are four gasholders, with a total capacity of 1,860,000 cubic feet.

*Governors and Mains.*

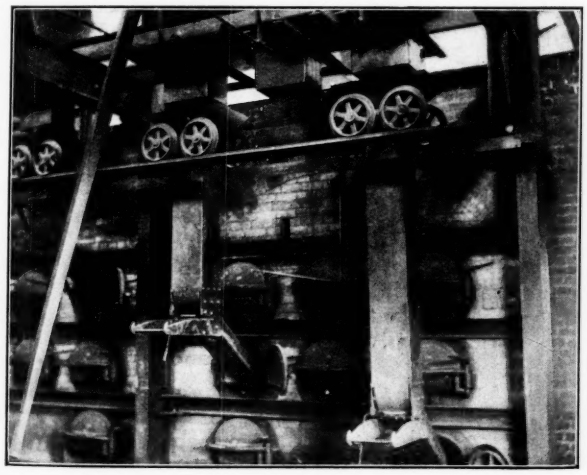
There are three 18-inch governors in all, working the Eastern, Western, and Central districts, and a fourth (a 10-inch) for the Mumbles district. The length of mains from the Mumbles to the extreme point of Morriston is 14 miles; and the total extent of mains is about 115 miles.



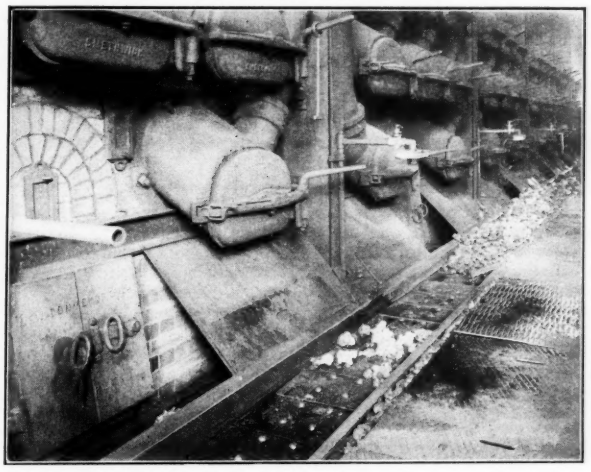
The Altered Retort-House with Benches being Built.



The New Purifier House under Construction.



The Shot-Pouch Chargers for the Inclined Retorts.



The Drawing Stage and Hot-Coke Conveyor.

PHOTOGRAPHS AT THE SWANSEA GAS-WORKS.

*Consumers, Etc.*

There are 6270 ordinary and 7850 coin consumers, and 6800 stoves. In addition there are about 250 gas-engines and 1981 public lamps.

The PRESIDENT asked if the elevating machinery really required all this horse power to drive it.

Mr. ANDREWS said that, after viewing the works and seeing the length of shafting and all it had to do, they would see that it was not very much in excess of what was necessary.

Mr. THORNTON ANDREWS added that the elevating engines were in duplicate.

PLACE OF NEXT MEETING.

It was resolved to hold the next meeting at Neath; and the President said that they could rely upon having a hearty reception there.

Mr. G. T. ANDREWS, though heartily supporting the resolution, expressed the view that it would be well, in arranging these outings in future, to have large works and small works visited alternately.

VOTES OF THANKS.

The PRESIDENT proposed a very hearty vote of thanks to the Swansea Gas Company for having invited them to hold their meeting there.

Mr. OCTAVIUS THOMAS seconded; and the resolution was passed with acclamation.

Mr. THORNTON ANDREWS thanked the Institution for having thus honoured them with a visit. It had given the Directors and himself the greatest possible pleasure.

After a vote of thanks to the readers of the papers, the business meeting terminated.

INSPECTION OF THE SWANSEA GAS-WORKS.

The party were then conducted by Mr. Thornton Andrews and Mr. G. T. Andrews round the Swansea Gas-Works, and all were much interested.

### The Luncheon.

At 1.30, the company were entertained at the Hotel Métropole by the kind invitation of the Chairman and Directors of the Swansea Gas Company. Mr. T. Travers Wood, the Chairman of the Company, presided; and he was supported by Mr. Jno. Glasbrook (the Deputy-Chairman), Dr. Griffiths, Messrs. W. I. Rees, Frank Edwards, and R. J. Cawker (Directors), Sir Griffith Thomas, Mr. Wm. Law, Mr. Thornton Andrews, Mr. T. N. T. Strick, and Mr. John Thomas (the Town Clerk).

After the usual loyal and patriotic toasts, the Chairman gave the toast of the "Wales and Monmouthshire District Institution of Gas Engineers and Managers," and in so doing said he hoped they had all been pleased with what they had seen at the Swansea Gas-Works, and that they had found them really up to date. If anybody had not been over them, he trusted he would, because, both from an engineering and financial point of view, they were a great success. The ideas in the paper read by Mr. Lister were very excellent; and if only he would carry them into effect in Swansea, it would be a godsend. He coupled with the toast the name of the President, Mr. Browning.

Mr. Browning, in responding, said they all felt very greatly indebted for the splendid hospitality they had received. They were still a young Institution, but they had received an excellent start in life. The aim of the Institution was the benefit of gas corporations and gas shareholders throughout the country. He moved a hearty vote of thanks to their kind hosts.

Mr. Thomas Canning, in giving the toast of the "Swansea Harbour Trustees and their Further Undertakings," referred in humorous terms to the friendly rivalry between the seaports of the Bristol Channel. There was, he was glad to know, a very friendly feeling between Swansea and Newport, and the Uskside town was in some ways the imitator of Swansea. Therefore he was prepared to propose the toast wholesale, and he hoped that the future undertakings of the Swansea Harbour Trust would be as successful as any of them could wish. They were now engaged at Swansea in making a new dock of 66 acres. He might tell them that in Newport they were building a dock which would cover 100 acres; but there was a reservation, for in that total he had included the dock already made.

Sir Griffith Thomas, the Chairman of the Swansea Harbour Trustees, in responding, said that a few years ago there was rather a lack of enterprise in the matter of dock making in the Bristol Channel; but he was glad to know that now it was very different. On all hands, they saw a movement for bringing all their ports up to date. The Swansea Harbour Trustees had always been able to get all the money they wanted to make extensions. The speaker, in conclusion, paid a high tribute to Mr. Thornton Andrews, the veteran Manager of the Swansea Gas-Works, who had made the concern pay good dividends regularly.

### Visit to the New Docks.

At three o'clock, the party, headed by the members and officials of the Swansea Harbour Trust, left the hotel in brakes and drove to the new docks now in course of construction; the visit forming the conclusion of a very pleasant day.

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The subject of the resistance of metals to corrosion by gas-engine exhaust gases was recently dealt with by Herr Julius Pintsch in "Gasmotorentechnik." Experiments were carried out in which sheets of various metals were exposed in the exhaust vessel (at 370° C.) of a gas-engine supplied with producer gas of low calorific value (800 to 900 kilowatt-calories per cubic metre), and the loss or gain in weight was noted after 5 months in one set of tests, and after 5½ months in another. Bronzes containing tin were attacked most by the gases; copper also was considerably corroded. The metals least acted upon were nickel and brass; the latter being more resistant the higher its content of zinc. Nickel steel was not corroded so much as cast iron, and was better the higher its content of nickel. The outer crust on cast iron exerted a very strong protective influence; but even machined cast iron was not strongly attacked.

In the course of a lecture delivered by Professor J. H. B. Masterman at Cambridge a short time ago, on the "Growth and Methods of our Present System of Local Government," he referred to the difficulty of getting into English municipal life the kind of man who would best administer the work. He said there was undoubtedly a tendency for men to go in for such work for the sake of something they could get out of it. He conceived that the problem could only be solved in two ways—first, by diffusing in the community a stronger sense of municipal service among those who are, by their intellectual and social positions, the natural leaders of the people; and, secondly, by creating the ideal that people who have provided adequately for their own needs in business should retire earlier than they now do, in order to devote themselves to the work of municipal service. It was deplorable to see men labouring to get a great store of wealth which they could not use, and which might prove to be not a blessing but a curse to their children, and wasting time which might be given to the public good in the administration of public affairs. Professor Masterman severely condemned the apathy of the elector in municipal affairs. It was only, he said, by the most industrious canvassing and the strongest exertion that they could get to the polls even so few as half the electorate. In this respect our democratic system was a failure.

# REGISTER OF PATENTS.

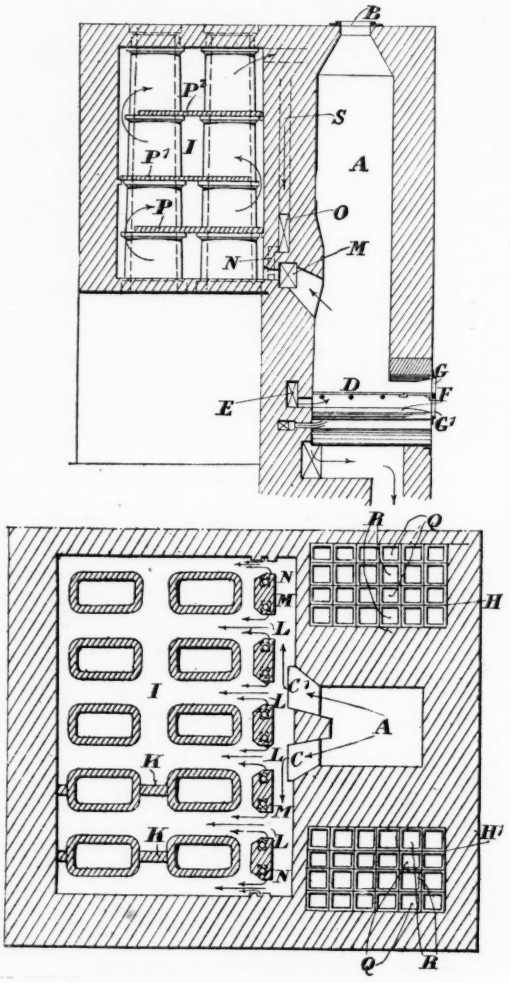
## Vertical-Retort Furnaces.

Bueb, J., of Dessau, Germany.

No. 16,579; Aug. 15, 1905.

The inventor points out that, with his vertical retort (as described in patent No. 1393 of 1904), it is more important than in the usual working of ordinary gas-retort ovens, that all the vertical retorts in the oven shall be heated uniformly, and that the heat shall decrease uniformly from the bottom to the top of each retort, "as where these conditions are not complied with, the operation is not such that the advantages of the process are fully attained."

In carrying out the process, freely developed flame and the various forms of forced firing—used with success in connection with horizontal and inclined retorts—have not proved satisfactory, because, with vertical retorts, arranged one behind the other, all their parts are not properly heated; some retorts being heated too much, and others too little, while the upper parts of the retorts were heated too much.




**Bueb's Modified Vertical-Retort Furnace.**

Dividing the retort-oven (as is done in some coke-ovens) by vertica walls into chambers heated separately, and containing each only one retort, is unsatisfactory; for, apart from the large quantity of fuel consumed, a very great amount of space is required, and the furnace supports are overloaded. The object of the present invention, therefore, is to provide a vertical-retort oven and heating arrangements fulfilling satisfactorily the requirements of the aforesaid process. Each retort, or each pair of retorts, is separately heated; this being effected by zig-zag currents of heated gases entering horizontally (or practically so) at the bottom of the oven between the broader sides of the retorts, or between the end retort or retorts and the furnace wall, and moving upwards in a zig-zag course between each adjacent retort or pairs of retorts.

A vertical section of the setting is given (in many respects similar to that which has already appeared in the "Journal"); also an enlarged horizontal section of same.

The essential parts of the apparatus comprise a heating-gas producer A, consisting of a shaft, preferably of rectangular section, provided with a charging opening B at top, and suitable outlet passages C and C¹ for the heating gas, a grate D, a primary-air supply E, a water-trough F, and doors G and G¹ for stirring the fire and removing the clinker—the producer being arranged on one of the long sides and in the centre of the retort-oven. On each side of the producer is a regenerator H and H¹, preferably consisting of square boxes of clay arranged on each

side of the producer, so that the plan of the structure as a whole is square. The producer and regenerators have the same height as the oven, so that the latter is protected from loss of heat by radiation from the longer side next the producer and regenerators. This arrangement has, further, the advantage that the shaft of the gas-producer can be attended from the same working stage, and with the same devices, as are used to charge the retorts. A chamber I in the oven, preferably rectangular, contains, arranged in one or two rows, a number of retorts—say, ten, for example, arranged in two rows of five each—which are preferably of rectangular cross section, and decrease in an upward direction. In the oven there are between the retorts no vertical partitions for guiding the heated gases, or only strengthening webs K between the narrower sides of the outer retorts and the oven wall. The heating of the retorts is effected through flared burner openings L, at the bottom of the oven at the side of the producer, and connected thereto by the gas-outlet passages C and $C^1$, and a passage M, extending at the back of the burner openings, which receive highly preheated air from downwardly arranged channels N and the main passage O.

The ignited gases pass first in a horizontal direction, heating the retorts along their broader sides, and then upward in a zig-zag direction over horizontal partitions P, $P^1$, $P^2$, so as to heat the retorts in superposed zones (say, four), so that the retorts are heated at a uniformly decreasing heat. The still very hot heating products accumulate in the upper zone, and from it pass into the regenerators H and $H^1$, flowing downwards, through sets of the boxes of clay Q, to the walls of which they impart their heat, so that the secondary air currents ascending through contiguous sets of boxes R are heated. The air currents unite in chambers above the regenerators and pass down passages S and supply air to channels O and N behind the heating-gas passage M. The burner openings are, preferably, as large as, or larger than, the channels N for the air.

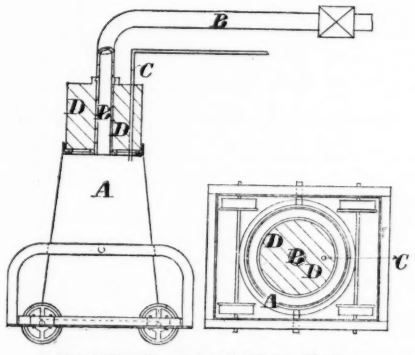
By suitably proportioning the gas and air channels and the cross sections of the other passages, and arranging adjustable slides in the oven, if required, and by controlling the chimney draught, it is possible, says the patentee, to regulate the heating of all the retorts, so that their temperature decreases in an upward direction in accordance with the decreasing internal area of the retorts.

## Utilizing the Waste Heat of Coke.

WADDELL, A. & F., of Dunfermline and South Queensferry.

No. 18,218; Sept. 9, 1905.

This invention relates to the utilization of the heat contained in coke as drawn from retorts in gas-making (or from ovens in coke-making) for the purpose of evaporating ammoniacal liquor, by bringing the liquor "into contact in a closed vessel with hot coke, to produce steam, which is passed, together with volatile products, from the liquor and coke, to distil further quantities of ammoniacal liquor."




**Waddell's Ammoniacal Liquor Heater.**

Hot coke is drawn from retorts into the vessel A, which is then moved on its frame to a position immediately under the cover D. This cover contains a supply pipe C, by which ammoniacal or other water is brought, and an outlet pipe B for carrying away the resulting gases or vapours. The cover is provided with a joint ring; and when the vessel is moved to a position closely beneath it, the cover is lowered very slightly so as to render the vessel A steam-tight. The pipes allow sufficient spring to permit the cover to bear upon the top of the chamber. In one way of effecting the tight joint, the cover is weighted by an amount which exceeds the pressure of steam in the vessel. Hot steam and ammoniacal vapours produced by delivering ammoniacal liquor or water upon the hot coke in the vessel A are led by the pipe B to heat the ammoniacal liquor still, which is usually done by steam produced in the ordinary way.

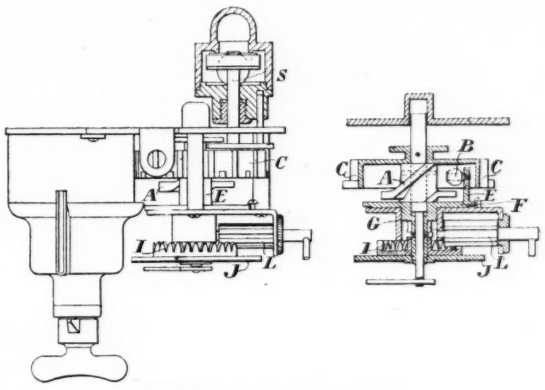
## Prepayment Gas-Meters.

STANSFIELD, A., of Oldham, and METERS LIMITED, of Manchester.

No. 18,693; Sept. 15, 1905.

This invention relates to gas-meter prepayment mechanism of the character described in patent No. 9026 of 1900. The object aimed at is to reduce the number of gear wheels employed in a device of this character, and to simplify the arrangement of the gear; and the invention consists in mounting upon the sleeve which carries the dial the member which engages with the cam, the crown-wheel which gears with the pinion on the spindle connected to the meter-gearing being secured directly upon this sleeve behind the dial, so that the number of gear-wheels is reduced, and the height of the mechanism considerably lessened.

In carrying the invention into effect, according to one construction, a connection between the coin-receiver and the parts operating the delivery mechanism is formed by means of a coin. A portion of the coin, when held in the receiver, falls into a jaw-piece formed on one end of the operating spindle, while the other portion engages with two diametrically opposite studs or the like on a wheel or rotary member, which is also provided with two additional pins on the same axle diametrically opposite one another, and of greater radius than the first-mentioned studs. The wheel is provided with two diametrically opposite notches, as described in the 1900 patent. These pins are adapted to engage a measuring wheel C, recessed and containing a cam A, with which there engages a friction-reducing roller or bowl B, carried by a pin, on a projection E, extending from the disc F, or arm which is mounted upon, or in one with, a sleeve G, projecting through, and supported by, the frame. On the end of the sleeve there is secured a crown-wheel I and the indicator dial J; the latter being




**Stansfield's Prepayment Gas-Meter.**

secured to the face of a backing disc, which serves as a removable nut, retaining in position the crown-wheel, which is slid along the sleeve. The crown-wheel is provided with a sleeved extension having slots, in which engage pins carried by the sleeve G. The crown-wheel gears directly with a long pinion L, reduced at each end to work in bearings—one end being connected with the meter gearing directly or through speed-multiplying gear (not shown) situated at any convenient position within the meter. The measuring wheel C is mounted upon a spindle which passes concentrically through the sleeve G, and carries the pointer. The wheel is provided with a collar or the like, between which and the side of the wheel there engages a collar on the valve stem S, which is guided in the frame. When the bowl B is rotated, it comes into contact with the cam A, which is, together with the measuring wheel C and its collar, moved towards the side frame, and the valve, in consequence, is closed (as in the principal illustration).

As in the earlier patent, the amount of gas to be supplied for a given coin or number of coins may be varied by changing the crown-wheel—putting on one of a smaller or larger number of teeth, as required; the removability of the dial rendering the changing operation a simple matter.

## Incandescent Mantle Fabric.

SCHIEFNER, T., of Berlin.

No. 20,066; Oct. 4, 1905.

The patentee points out that a special characteristic of jute consists in the length of its fibres; and the important part played by the length of the fibres in the yarn employed in the manufacture of incandescing mantles is also known. The greater the length of the fibres, the longer are the capillaries presented by the threads to the fluid; and this results in increased absorption of the fluid and more uniform impregnation of the fabric.

As jute fibre has been successfully broken up to such an extent as to permit of its being spun into yarns of sufficient fineness, there is no difficulty in employing it for the making of incandescing mantles; and the present invention consists in the manufacture from jute yarn of woven, knitted, or other fabrics employed for the production of incandescing mantles of all kinds.

The manufacture of the fabrics from jute yarn constitutes, it is said, an important improvement, owing to the fact that, on the one hand, the properties of the fabric of absorbing the fluid and evenly distributing it throughout their mass are increased as compared with ramie yarn, and, on the other hand, the production of incandescing mantles of best quality is rendered independent of the use of ramie yarn.

## Sound-Suppressing Device for Gas-Stoves.

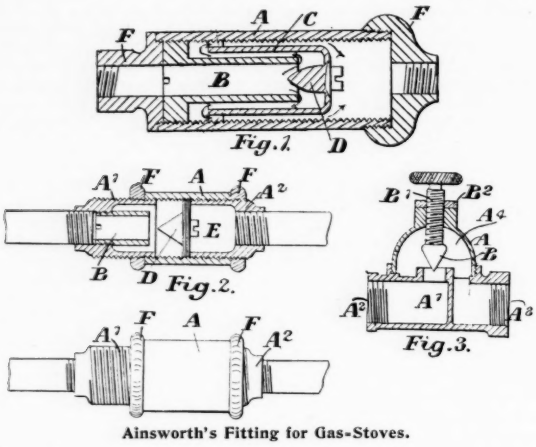
AINSWORTH, F., of Ilford.

No. 21,184; Oct. 18, 1905.

This invention relates to means for obviating the hissing which occurs when using certain gas appliances—for instance, when the plug of the cock of a gas-fire or other like appliance is turned so as to limit the passage of gas. Means constructed according to the invention will, it is said, also obviate the noise which occurs with such gas appliances when the full supply of gas required is turned on.

As shown in fig. 1 (p. 704), a casing A is adapted to be inserted in the gas-supply pipe intermediate between the cock of ordinary construction and the gas appliance. The casing is provided with a tube B in line with, and connected to, the gas-supply pipe. It is surrounded by a second tube C, so that an annular space exists between the two. The tube C is provided with passages through which the gas passes on its

way to the exit side of the device, and with a central cone or other limiting surface D, by means of which, together with the tube C, the gas is baffled prior to its passage through the remaining portion of the fitting. The exit side of the device is preferably provided with an expansion chamber E. F are nipples by means of which the device can be inserted in the gas-supply pipe.




**Ainsworth's Fitting for Gas-Stoves.**

In fig. 2 (an alternative construction), the adjustable cone or other limiting surface D forms part of, or is carried by, a hollow union A, which screws on to two sleeves $A^1$ and $A^2$ inserted in the gas-supply pipe intermediate between the cock of ordinary construction and the gas appliance. The sleeve $A^1$ may be provided with an extension or separate tube B in line with, and connected to, the gas-supply pipe. The exit side of the device is preferably furnished with an expansion chamber E. Orifices of suitable size are provided at the base of the cone. F and $F^1$ are lock-nuts for securing the cone D in its adjusted position and at the same time preventing leakage of gas.

In fig. 3, the fitting A is provided with a vertical mid-rib $A^1$ dividing it into an inlet side $A^2$ and an outlet side $A^3$, both of which sides communicate with an expansion chamber $A^4$ of dome shape. The orifice forming the communication between the inlet side $A^2$ of the fitting and the expansion chamber $A^4$ is preferably prolonged to a certain extent, and the orifice connecting the outlet side $A^3$ of the fitting with the expansion chamber $A^4$ is preferably made of considerable size. B is a limiting surface or cone provided on the lower end of a screw $B^1$ and adjustable towards or from the orifice. It is secured in its adjusted position by a lock-nut $B^2$.

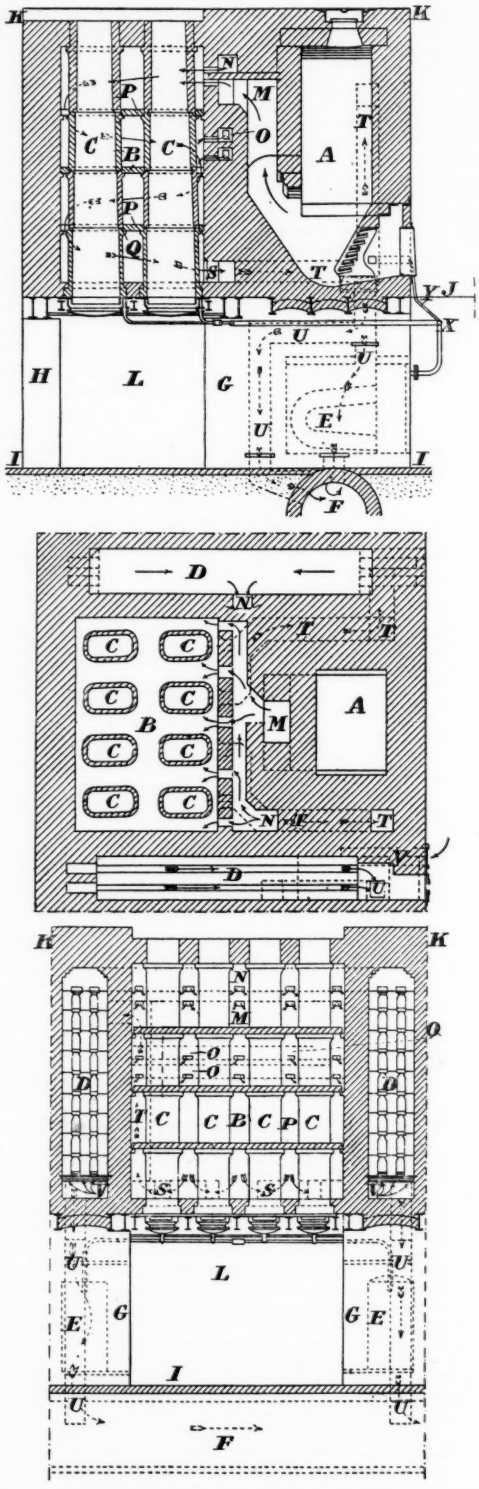
## Furnaces for Vertical Retorts.

DERVAL, E., of Paris.

No. 2040; Jan. 26, 1906.

The patentee claims as his invention: (1) A furnace for vertical gas-retorts the feature of which is that the producer and regenerators are placed above the level of the bottom of the furnace, or of the floor for attending to the grate of the producer, and rest upon masonry piers, in which are placed the steam-generators and the outlets for the products of combustion. (2) Introducing the products of combustion into the upper part of the regenerators for the purpose of increasing their efficiency by causing the products of combustion to circulate in a direction opposite to that of the air introduced at the bottom of the regenerators. (3) A method of heating vertical gas-retorts which consists in the employment of a row of burners and air apertures placed at the upper part of the furnace; three horizontal divisions forcing the products of combustion to change their direction four times before reaching the outlet openings; and a row of air apertures for the admission of a second supply of hot air for heating the products of combustion at the beginning of their third change of direction, so that they may suitably heat the bottom of the retorts.

The illustrations show: A section taken through the centre of the producer for the gas to heat the retorts; a longitudinal section taken through the centre of the combustion chamber of the furnace showing the arrangement of the retorts and a cross section of the regenerators, and a horizontal section taken through the burners. The feathered arrows show the course of the flame and smoke; the plain arrows that of the air and heating gas. A is the gas-producer; B, the combustion chamber of the furnace; C, the retorts; D, the regenerators, placed at each side of the producer, for utilizing the waste heat of the products of combustion, in order to heat the air necessary for the combustion of the gas generated in the producer; E, steam generators (preferably tubular boilers known as "Solignac" boilers); F, flue leading to the chimney; G, masonry piers supporting the gas-producer, a part of the combustion chamber, and a part of the regenerators, and serving besides to receive the steam-boilers and outlets for the products of combustion; H, masonry piers or cast-iron columns supporting the floor of the combustion chamber and a part of the regenerators; I, the ground level of the retort-house; J, the level of the floor for attending to the grate of the producer; K, the floor or bridge for charging the producer and the retorts; L, empty space for giving free passage below the gas-producer and combustion chamber for operating the lids of the mouthpieces, introducing the steam into the lower part of the retorts or into the gas-producer, for supervising the removal of the coke, and for other purposes; M, channel leading the gas from the producer to the burners; N, channel leading the hot air from the regenerators to the burners; O, channels leading the hot air to the apertures intended to effect a second introduction of hot air at about the middle of the course of the flame, to burn the gas still remaining in the latter; P, refractory slabs (perforated or not) forming baffles which force the flames or hot products of combustion to change their direction four times before leaving the combustion chamber; Q, ribs or fillets supporting the cross-tie slabs P; S, outlet for the flames (hot products of combustion) from the combustion chamber; T, channels leading the products of combustion to the upper part of the regenerators; U, channels leading the products of combustion to the flue F, either directly or after passing them through the steam generators;




**Derval's Furnace for Vertical Gas-Retorts.**

V, inlets for cold air into the bottom of the regenerators; X, collecting pipe receiving the steam from the steam generators; Y, branch pipes from the collecting pipe X for delivering a part of the steam generated in the boilers to the gas-producer.

The type of furnace shown, with a large regenerative surface, is especially suitable for works where there is sufficient room, and where there is no water to prevent the construction of the smoke-flue F underground; otherwise, it is better to place the smoke-flue immediately below the producer, and not prolong the regenerators beyond the sides

of the combustion chamber. This can be easily done without altering the general arrangement of the furnace or its mode of action, except that the passage under the producer would be omitted.

The method of heating the retorts is somewhat similar to that described (in connection with furnaces for inclined or horizontal retorts) in patents No. 7526 of 1899, No. 10,539 of 1902, and No. 15,860 of 1904—that is to say, the gas is incompletely burnt at the upper part of the retorts by a first admission of hot air, and the products of combustion are then reheated and more or less completely burnt by a second admission of air at or about the middle of their course. As in the earlier arrangements, the products of combustion change their direction four times before leaving the combustion chamber, and are re heated at the beginning of their third change of direction by a further admission of hot air, taken (by preference) from one of the regenerators, which allows of regulating with great precision the quantity of hot air delivered to the upper row of burners—that is to say, for the first combustion of the gas, and also of that which is intended to complete the combustion of the gas which the products of combustion still contain—second combustion. A very regular heating is thus obtained, and the different sections of the retort, especially the lower ones, "may be brought to the temperature required for obtaining a good distillation of the coal."

Another characteristic of the invention is the arrangement for bringing the products of combustion to the upper part of the regenerators in such a manner that, the cold air entering at the bottom of the regenerators, the circulation of the two fluids takes place in opposite directions. The efficiency of the regenerative apparatus is thereby considerably increased, and the secondary supply of air is delivered much hotter than if the products of combustion traversed the regenerator from below upwards—that is to say, in the same direction as the air.

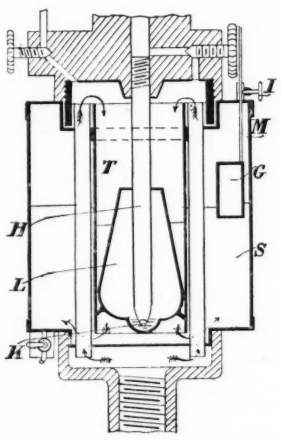
## Automatically Lighting Gas-Lamps.

KISSEL, W., of Königswusterhausen, Germany,

No. 14,661; June 27, 1906.

In this automatic lighter for gas-lamps, the gas flows from the supply pipe to an inner chamber T, through pipes that pass, airtight and watertight, through the bottom and cover of an outer chamber S. The chamber T is mounted on the under side of the cover of the chamber S in such a manner as to bring the liquid contained in the chambers into communication with each other.

In apparatus of this type as heretofore constructed, the liquid (usually glycerine) is, through the change of pressure in the gas, forced from the chamber T into the annular chamber S; while simultaneously with the lowering of the level of the liquid in the chamber T the float L descends, and thus opens the orifice of the burner-tube H.




**Kissel's Automatic Gas-Lighter.**

The adjustment of the depth to which the burner-tube is immersed is at present effected by so regulating the quantity of glycerine contained in the chambers S and T that the change of level due to the pressure variation of the gas suffices to so raise or lower the float L (together with its mercury seal) as to open or close the orifice of the stationary burner-pipe.

In patent No. 14,923 of 1905, the difference between the level of the liquid in the mercury seal K and the level of the extremity of the burner-tube H is adjusted by a screw device on the burner-tube and, if necessary, by the withdrawal of superfluous glycerine. The operation of adjusting the depth to which the pipe H is immersed in the mercury seal K, by increasing or diminishing the quantity of glycerine, is, however, a slow and tedious one; and the present invention has for its object to provide for effecting the adjustment by means of a plunger G, partially immersed in the glycerine contained in the chamber S, and the extent of immersion of which can be varied by loosening the set-screw I, raising or lowering the plunger by means of its handle M until a suitable adjustment has been made, and then again tightening the screw.

## Producing Incandescent Mantles.

ALBRECHT, H. C., of Berlin.

No. 15,295; July 5, 1906.

This invention consists in first impregnating the woven and shaped fabrics with solutions of nitrates of thorium and cerium as usual; then drying them; next impregnating them with hydrogen peroxide; and thereupon drying, burning, and calcining them as usual with other forms of mantles.

The mantles impregnated with solutions of nitrates of thorium and cerium will, it is said, after their drying, contain nitrate of thorium—that is, a salt which, by the action of the hydrogen peroxide, will be turned into hydrate of thorium, which is no longer a salt. The nitrate of thorium contained in mantles treated in the old manner will, by the burning and calcining, be turned into the known thorinic oxide, which is a loose and powdery mass that can be spread by rubbing between one's fingers; but a piece of nitrate of thorium of the size of a pea, when placed in a platinum-dish and calcined, will, during its change into thorinic oxide, swell or blow up so strongly as to form a sort of foam, which bubbles out of the platinum dish. On the other hand, the hydrate of thorium as contained in the mantle treated in the suggested new manner will, by the burning and calcining, be turned into an unknown thorinic oxide, which seems to contain more oxygen than the ordinary thorinic oxide ($ThO_2$). This new highly-oxidated salt of thorium is quite distinct from the known thorinic oxide. When formed in the platinum dish, it will be crystalloidal and hard, like a diamond; and it will possess great refractive power. The hydrate of thorium does not swell nor blow up in the platinum dish, but will sinter together rapidly.

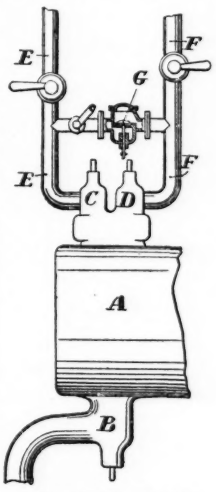
The incandescent mantle treated according to this new method is, it is claimed, very soft, elastic, and durable to a degree hitherto unknown. Trials have proved that it will withstand more than 3000 mechanical shocks in vertical and horizontal directions—many more than is possible with the ordinary sort.

## Gas-Engine Working with a Gas-Producer.

PIERSON, J. & O. G., of Paris.

No. 14,923; June 30, 1906. Date claimed under International Convention, June 30, 1905.

This invention relates to an arrangement for controlling engines burning poor gas and working with a gas-producer, and consists in connecting the gas-inlet pipe to the air-inlet pipe by a suitable passage or bye-pass provided with means for regulation.




**Pierson's Gas-Engine Controller.**

A is the cylinder of the engine burning poor gas, B an exhaust valve, C a gas-admission valve, D an air-admission valve, E a pipe for the inlet of gas, and F a pipe for the inlet of air. While the engine is at work, the governor acts upon the gas-valve "upon the principle of all or nothing." After an idle stroke, the gas-valve remaining closed, a small quantity of gas will nevertheless be sucked through the non-return valve G; the cock near by having been set for the purpose, and the suction will remain sufficient for the proper working of the producer. There will thus be obtained the same continuous suction effect as with a double or multiple cam, for it will be possible to regulate the cock according to the average power developed by the engine, and this will conduce to the minimum consumption of gas, while at the same time it will keep in the producer a suction sufficient to maintain the quality of the gas constant.

With any fixed governing arrangement (such as in an inclined cam or a cam with one or more steps), it is indispensable that governing should be carried out in such a manner that the engine can work without failing at the lowest powers, and can take a maximum quantity of gas. A large amount of gas is therefore sent to the exhaust and lost. With the present arrangement, in installations in which the power is regular for the whole day, the cock may be almost completely closed; in those in which the power is variable, it will be allowable to open the cock full, but always limiting the gas lost to the strict minimum.

This regulation may take place automatically by means of the engine, by making use of the governor, or, better, by utilizing the fall in pressure due to the suction of the motor, or, again, the power of the explosive in the cylinder and in the exhaust.

**The German Emperor and the Use of the Divining-Rod.**—According to the Berlin correspondent of the "Daily Express," the German Emperor has given his royal approval to the use of the divining-rod for the discovery of underground springs. Prince Hans von Carolath, formerly Commander of the 7th Cuirassier Regiment, who is a master in the use of the divining-rod, was invited by the Kaiser to give a personal demonstration of its mysteries while the Imperial family were recently staying at Wilhelmshöhe. The experiments began with the finding of various articles of jewellery; but subsequently the Prince was asked to endeavour to find a spring in the park surrounding the palace. This was also done; the Prince discovering water in a locality where its presence had not been imagined, and following its subterranean course for a considerable distance. He also informed His Majesty that he had ascertained that there were several mineral springs in the neighbourhood of the park; and the Kaiser gave instructions that boring should be begun immediately to prove the truth of the assertion. Prince von Carolath also discovered the presence of water deep in sand over which the Kaiser had unsuccessfully experimented. In thanking his guest, the Kaiser said he trusted the mysterious powers of the divining-rod might be made generally known, because much public benefit would thereby accrue.

# CORRESPONDENCE.

*[We are not responsible for the opinions expressed by Correspondents.]*

## Coal Prices.

SIR,—Mr. Alderman Gainsford has made a mistake in saying that I anticipate a great rise in the price of coal next year; and for that reason alone I reply to his letter.

I did not, and I do not, anticipate a great advance of price. I said at the South Metropolitan Company's meeting that on the three previous occasions an advance of 1s. or 2s. had been followed by outrageous advances in the next year. In each case the price of Newcastle coal was raised to about 8s. f.o.b. the first year and to 20s., 12s., and 16s. respectively the second year. This season the price was advanced to between 8s. and 9s. f.o.b. in the Tyne; and all that I anticipated was the possibility that the coalowners might attempt to repeat next year their precedents of the three previous occasions. At those times the gas companies were a rope of sand, and weakly gave way under the fear that they would not be able to obtain coal.

Precedents are often set by small companies who, yielding to fear, pay the prices asked. It is panic and not famine, as it was called in 1873, that makes them yield. It was against this that I desired to warn them. Happily the large companies are all pulling together; and this is the reason why I do not anticipate an advance, though I certainly expect the coalowners will try to get it.

GEORGE LIVESEY.

*Sept.* 8, 1906.

## Wexford Gas Company.

SIR,—Referring to Mr. Lyne's letter in your issue of the 28th ult., I am sorry he should consider any of the references I made to Wexford uncomplimentary. They were not so intended; and I would make amends to him by repairing the omission he points out, and say publicly what I have often said in private conversation—that the Wexford Gas-Works, even allowing for low capital and other advantages, must also be exceedingly well and economically managed for gas to have been sold there so cheaply for so many years.

R. B. ANDERSON.

5, *Westminster Chambers, S.W., Sept.* 7, 1906.

## Tar Painting of Roads.

SIR,—I should like to give, through the medium of the "JOURNAL," particulars of a little experiment that I tried in tar painting roads on May 18 last. I set two men to thoroughly clean 200 yards (in length) of the roadway in front of my own house, and then to paint the same length with ordinary coal-gas tar (cold), not being heated in any way except that it was a fairly warm day. Half the roadway was taken at one time, so that the traffic was not interfered with at all. After painting with tar, a coating of fine gravel was put on; and on the following day the roadway was dry enough for traffic. The road was not prepared in any other way. I do not agree with Mr. Maybury that the tar peels off like sheets of paper; nor is there any evidence of the tar getting soft from the heat of the sun. After 3½ months, there are only slight signs of wear in the centre of the road.

As a dust preventive coal tar is unquestionable; and that it has been well tried is also without question, as there is a very heavy traffic of all sorts on this particular road. So pleased was our largest shopkeeper with this work, that he asked the Council to get it done in front of his establishment, and offered £1 towards the expense. His request has been complied with, and the painting is working well.

Without any special sprinkler or similar appliance, the expense of putting on a single coat (including everything) works out at slightly under ½d. per superficial yard. I believe it would be better if a second coat was put on about a week after the first. That the road is practically waterproof is very evident after a shower of rain; and one of the greatest advantages I see from the painting of roads with tar is the almost complete absence of mud.

ROBERT YOUNG.

*Gas-Works, Youghal, Sept.* 3, 1906.

SIR,—Like many other gas managers, I am not inflicted with a stock of oil-gas tar which I do not know how to get rid of; but I do see before me a fair prospect of disposing of my coal-gas tar for road repairing purposes at a fair price, unless the prospect is blighted by such evidence as Mr. Maybury's and such letters as Mr. Glover's.

Mr. Glover very properly indicates the weak point in Mr. Maybury's evidence—namely, that he (Mr. Maybury) seemed to think that what was necessary was a film of thick tar on the road surface—the real *desideratum* being that the tar should sink into the road surface and form a cement with the binding material. This was strongly emphasized by M. Heude, the Engineer-in-Chief of Roads in the Department of Seine and Marne, for the year 1905—after trials extending over four years in his department. For this purpose, ordinary coal-gas tar from gas-works is extremely well adapted, if properly applied and of sufficiently light specific gravity. The experiments in the Seine and Marne Department have conclusively proved this. Now Mr. Glover writes as if coal-gas tar had been found wanting, and oil-gas tar had been proved to be a success. What evidence can he produce as to the permanent results obtainable by its use, to be compared with that set forth in the report of the French engineers? So far as I have been able to learn, the experiments at Tunbridge Wells—made, I believe, in the early part of this year—and those carried out by Mr. Glover, are the only instances of oil-gas tar having been tried on the roads; and though it may prove a success eventually (which, for the benefit of those who find a difficulty in getting rid of their oil-gas tar, I hope it will), it yet remains to be seen what its permanent effects are. My own view is that the consistency of the tar requires to be adapted to its purpose. If it is too heavy, it will not penetrate the road, but form a film on the surface; if it is too light, there will not be sufficient pitch in it to form a cement which will last through the winter.

This year Mr. H. G. Himson, the Surveyor to the East Dereham Urban District Council, has covered long stretches of roads with tar from my works, which had a specific gravity of 1·170. There was practically no film at all formed on the surface; the tar being completely absorbed and penetrating to a depth of 1½ inches. The tar was heated in a tar-boiler, and spread by hand without the aid of any expensive apparatus. Last year Mr. Himson made an experiment with a short stretch of road; but the road was too wet and the tar of too heavy a specific gravity, and a film was formed on the surface which caked off in the winter. But as to the tar getting soft and sticky, there has not been, during all the hot weather we have had this summer and autumn, the faintest sign of it.

I enclose a copy of Mr. Himson's report to the Council in June of this year, setting out all the information on the subject obtainable from the French engineers' reports and other sources, together with a note of a few experiments I made for him. It will be seen from this report that the permanent results obtained by using ordinary coal-gas tar have been extremely satisfactory, not only in preventing dust and mud on the roads, but also in reducing the cost of maintenance and upkeep of the roads.

H. KITSON.

*Gas-Works, East Dereham, Sept.* 7, 1906.

[The report referred to by our correspondent will be found in our "Miscellaneous News" below.—ED. J.G.L.]

# MISCELLANEOUS NEWS.

## TAR-PAINTED ROADS.

### Interesting Report.

The following is the report of Mr. H. G. Himson, the Surveyor to the East Dereham Urban District Council, on the subject of "Tarred Roads," which is referred to by Mr. H. Kitson, the Council's Gas Manager, in the above letter. Some of the information contained in this report appeared in the "JOURNAL" on Aug. 14 (p. 443), in the course of a translation of an article by Dr. Guiglielminetti, which was made by Mr. Frederic Egner and reproduced in our pages from the "American Gaslight Journal."

I was kindly placed by the Editor of the "Surveyor" in communication with Dr. Guiglielminetti, of Paris and Monte Carlo, the Honorary Secretary of a French "Society for the Suppression of Dust," and pioneer of road tarring on the Continent. The latter very courteously sent me (1) the report for 1905 of the Engineers of Roads and Bridges in the Department of Seine and Marne; (2) the report of the Engineer of Roads in the Department of the Seine; (3) an article communicated by himself to the German Medical Association; and (4) a short memorandum by himself. Dr. Guiglielminetti sets forth the hygienic effects produced by the application of tar to the roads. The dust is almost completely suppressed; and bacteriological investigations show that the number of active germs in the air is remarkably reduced over tarred streets. The comfort of the pedestrians and residents near the roads is consequently greatly increased. Moreover, practically no mud is formed on the tarred roads; and they are always cleaner and drier in winter than untarred ones.

#### ECONOMY IN COST OF MAINTENANCE.

But great as these blessings undoubtedly are, I am afraid there would be little likelihood of the process being largely adopted if it involved any great addition to the cost of upkeep of the roads. Luckily, that is not the case. Indeed, there appears to be a decided economy in cost of maintenance. Thus, M. Guillet, of the Arrondisement of Melun (Seine and Marne), in his report, instances the Avenue Thiers, in Melun. Here he found, before tarring, the road required remetalling every four years; by tarring, its life was prolonged another year, and the consequent saving of metalling was about identical with the cost of tarring during the five years. Consequently, the whole of the reduction in the cost of sweeping, scraping, and watering (which was very considerable—5 centimes per annum per square metre) was clear saving. In this calculation, M. Guillet allows 5 frs. per 100 kilos. for the cost of tar at the gas-works, and 2·10 frs. per square metre for the cost of remetalling.

M. Sigault, of the Arrondisement of Meaux (Seine and Marne), gives two instances: (1) A road of 1100 metres in length, with heavy traffic and under bad conditions as to slope and aeration, was remetalled in 1902. 500 metres of its length were tarred in 1903, 1904, and 1905. At the end of 1905, the tarred portion was in good condition. The other 600 metres were not tarred; and in 1905 it had been necessary to remetal 450 metres, and the remetalling of the remainder had only been deferred through lack of funds. (2) Two adjoining sections of a road, each with a surface of 1100 square metres, were remetalled in 1902. One was tarred in 1903, and the other not. During the following winter, the untarred section had to be scraped nine times; the tarred only once. From the untarred section were removed 24 cubic metres of mud; from the tarred, only 2 metres, and the bulk of such 2 metres was extraneous matter brought on the road, From this latter example, M. Sigault makes a somewhat elaborate calculation, by which he shows that (taking only 8 cubic metres of the extra mud on the untarred road as being *débris* from the actual wear of the road), the wear and tear saved by tarring would theoretically be approximately that arrived at in practice by M. Guillet.

M. Arnaud, Engineer of the Department of Seine, gives the example of the Avenue Torelli, at St. Mandé, much used by motors (3000 a day have been counted). This had in 1905 the appearance of a newly-rolled road, although it had not been remetalled since 1902, but had only been tarred each year. Before tarring, it required remetalling every three years.

M. Forestier states that the durability of a newly-metalled road, carrying heavy traffic, is increased one-third by tarring.

M. Heude, Engineer-in-Chief, Seine and Marne, says: "We shall in this district continue to tar newly-metalled roads which have a heavy traffic (especially motor traffic), and everywhere where particular circumstances cause a rapid disintegration of the constituents of the road. On this point, our experience is settled. We are decided." The experiments from which these deductions have been drawn have been sufficiently extensive; the extent of road tarred in Seine and Marne alone being in 1905 about 120,000 square metres.

### The Cost of Tarring Roads.

The cost of tarring roads varies considerably according to the cost of tar, the distance it has to be carted, the cost of labour, &c.

M. Guillet, as before stated, paid 5 frs. per 100 kilos. for his tar at the gas-works (or about £2 per ton, or 2½d. per gallon for tar if the specific gravity is about 1·200); and on a good road made of hard material with tar obtained on the spot, and the work done by men who had some experience, the cost worked out at about 11 to 12 c. per square metre (say, 1d. per square yard) for a first application, and 9 c. per square metre (about ¾d. per square yard) for a second application.

M. Arnaud does not state the price of the tar, but estimates the cost at from 15 c. per square metre for the first tarring to 10 c. for succeeding applications; the first application requiring 1½ kilos. per square metre, and the succeeding 1 kilo. only—about 3 pints per square yard for the first application, and 1 quart for subsequent applications.

The calculations and experiments above described relate to the primitive process of brushing the road by hand, heating the tar in a boiler, distributing by watering-pots, and spreading with a brush, which entails a considerable cost for manual labour—a cost that might be very greatly reduced by suitable apparatus.

M. Girardeau, Engineer of Roads and Bridges in La Vendée, estimates that the tar required is only 1050 grammes per square metre for the first year, 700 grammes in the second year, 300 grammes in the third year, and in the fourth no tarring was required on a street (with a daily traffic of 650 vehicles) which had been thus treated, the surface crust being still intact. It is not difficult therefore to roughly estimate the cost in any locality.

### The Necessary Conditions for Success.

The road to be tarred should be in good condition and shape, made of materials hard enough to resist the traffic it has to bear, and made up with as little binding material as possible. When newly remetalled, a road requires to be left till thoroughly consolidated before tarring, the time for which depends upon the hardness of the material and the quantity of water available when rolling. When the material is sufficiently hard, and water is plentiful, the road may be compressed sufficiently so that it is only for the necessary drying of the road that one has to wait. The road must be quite dry; dampness is the great drawback to success. The road must also be as warm as possible; and for this reason the work should only be done on fine, warm days, and on those days preferably only in the heat of the day. The road should be thoroughly brushed before the application of the tar. In summer, it is sufficient, according to M. Sigault, to brush with the sweeper; but generally it should be hand swept after sweeping by machine.

The tar must be heated to about 80° C.; though it will require watching if boiled in an ordinary boiler, as at this temperature it has a tendency to boil over. It must be put on quite hot and liquid, and will then penetrate to a depth of from 3 to 5 centimetres. It should be evenly distributed, either with watering-pots or other sprinkling arrangement, and subsequently spread with brooms. M. Guillet says cocoa fibre brooms are preferred to bass brooms, as being softer and fitting better into the rough places in the road.

The amount of tar used must be proportioned to the nature of the material and the absorbent condition of the road. M. Sigault says the tar is absorbed by the road; but when this is impregnated, the surplus remains on the surface in a liquid state, and only hardens slowly by mixture with the dust.

On a second application, the old skin of the previous application should as far as possible be removed, and care must be taken not to allow the tar to form sticky places likely to cause slipping.

No subsequent treatment is mentioned by the French engineers, though Dr. Guiglielminetti suggests the sprinkling with dry sand, particularly in any places where the tar remains moist. (From our experience here, it seems advisable to give the tar a chance to get absorbed before applying sand.)

The traffic should be kept off it for 24 hours, though the passage of a few vehicles does no harm to the road. It is more convenient to do half the width of a road at a time, and after 24 to 48 hours the other half is treated. On roads which are of too steep a gradient for it to be wise to tar the whole, M. Sigault has tarred the edges with great advantage.

M. Sigault records the successful retarring, at the end of October, of a road subjected to great wear; and this might perhaps not be a difficult operation on a dry day at such a season, in spite of the coldness of the weather, if the tar were sufficiently light or rendered so by the addition of light oil.

### The Apparatus Used.

The apparatus used has hitherto been of the rudimentary description beforementioned; but the necessity of making the most of the few days of the year available, and for reducing the cost of laying the tar, has brought to the front apparatus of improved nature. Notably, there is M. Lasailly's patent boiler and distributor, with which 10,000 square metres can be laid in four hours, a description of which Dr. Guiglielminetti kindly forwarded to me.

M. Sigault also records experiments with tar in remetalling roads. One of these was successful, in which, before the metal was put on, the old road was tarred with about 3 kilos. to the square metre. After the new material was spread, it was blinded, watered, and rolled in the usual way; and it was consolidated with remarkable ease and a very small consumption of water. The other two (in which the new material was rolled dry, and then sprinkled with tar and rolled without any watering or binding material) were failures. And undoubtedly the most successful way of incorporating tar in making up a road with new material, is to heat the material and dress it with tar before applying, as is done with Tarmac and Constable's tar macadam, with both of which we are experimenting here this year.

### A Cold Tar Process.

A cold tar process was tried in the Department of Seine and Oise, in 1905, which gave satisfactory results in that year; but how it stood the test of winter is not yet reported. This is stated to have been done by mixing 10 per cent. of heavy oil with 90 per cent. of tar. Probably what is known as light oil would be more suitable.

### Work in England.

In spite of wide-spread inquiries, I have been able to obtain very little information as to what has been done in England in this matter.

Information was very kindly given me by Mr. Vickers, the Highways Superintendent of Battersea. There, immediately after the application of the tar, the road is spread with an even coat of fine shingle, not bigger than would pass a ⅜ mesh, which is rolled with a 6-ton roller. The cost of this method of treatment, using tar of a specific gravity of 1·205, costing 3d. per gallon, and shingle costing 6s. 6d. per yard cube, is about 1½d. per square yard. In spite of the increased first cost, this is probably justified by results; for a very dry road which has been newly well swept has the small materials removed from the interstices of the stones, and the points of the stones stick up and are exposed to the wear and tear of the traffic, from which they would no doubt be largely saved by filling the crevices with the rolled-in chink.

Mr. A. Ernest Prescott, of Eastbourne, kindly informed me that he had treated both granite and flint roads with tar ("the ordinary residue from the gas-works"), boiled for three or four hours, in the proportion of four barrels of tar to one of pitch. The roads being first well swept with a bass broom and being thoroughly dry, the tar was applied with ordinary tar-brushes dipped in buckets. Immediately the surface was finished, it was mixed with a mixture of fine grit, red sand, the dust taken from the road, and a little lime—four loads grit, two sand, one sifted dust, and one lime.

Here attention should be called to a point of which the French engineers make no mention, and the surveyors generally seem to overlook. They mostly write of tar obtained from gas-works as if it was a uniform product, which is very far from the fact. Gas tar at ordinary temperature is more or less liquid according to the proportion of the oil which it contains, and of which the specific gravity of the tar may be taken to be a fair, if rough, index. This specific gravity varies at different works from about 1·100 to about 1·300 and at every gas-works from time to time in a lesser degree according to the coal that may be used and the method of carbonization. The consistency at (say) 60° Fahr., of course, varies accordingly, from that of water to that of warm toffee. As MM. Heude and Sigault point out, the tar must be sufficiently liquid to penetrate the road and form a cement with the small materials and binding material, and what remains on the surface is apt to be sticky and cause slipping, and become a great nuisance without doing any good unless treated in the special method used by Mr. Prescott. The consistency of the tar used is therefore a most important matter. If too heavy, it will thicken on being poured on the road, and will not penetrate; If too thin, there may possibly be too small a proportion of the pitchy cement to be effective.

It would be useful therefore if surveyors, in recording their experiments, would note the specific gravity of the tar.

H. G. Himson.

*June*, 1906.

## Collapse of a Cable Transporter.

A serious accident occurred last Tuesday at Honor Oak, where a large reservoir is being constructed for the Metropolitan Water Board. A cable transporter, which had just been built, collapsed when being tested; and the Engineer to the Contractors, Mr. John Sharpe, of Aberdeen, was thrown off one of the high stages and killed instantly. The cable way was 700 feet long, and the stages at each end were columns of girders 60 feet in height. Mr. Sharpe, who was a widower with a family, had seen the transporter finished, and was anxious to return to Scotland. He accordingly paid a special visit to the scene before the usual working hours, to see the structure tested. He climbed to the top of the lower or tail column while a heavy load of material was sent along the cable. When it was about half way between the towers, the foundation of the one on which Mr. Sharpe was standing gave way and the tower began to sway. From the direction in which it was falling, it was evident that Mr. Sharpe would strike a large iron pipe on the ground below; and, apparently in the hope that he would escape it, he leaped forward. He missed the pipe, but was dashed to the ground. His ribs were broken and penetrated the heart. The reservoir when completed will be the largest covered reservoir in the world, having a capacity of 60 million gallons. Four hundred men are at work upon it. The men had just reached the works and were ready to start when the accident happened. Had the collapse occurred half-an-hour later, the consequences would in all probability have been much more disastrous. The reservoir is being constructed by Messrs. J. Moran and Co., of Westminster, but another firm were responsible for the transporter. At the subsequent inquest, Mr. Archibald Snodgrass, Works Manager to Messrs. Moran, stated that on the Monday evening (the day before the accident) deceased fastened up the main cable, and took a tip up to the roof of the reservoir. On Tuesday morning, after the smaller cable had been tightened, he started one of the tips along the cable to test that one. At the time deceased was standing on the platform at the masthead of the south-end tower. When the tip had gone a little distance along the cable, witness noticed the masthead on which the deceased had been standing fall. The whole structure was pulled over, and the deceased fell with it, and was killed. The weight of the tip and the material was about 2½ tons. When the transporter was finished, it was proposed to carry 10 tons. Deceased was a most capable man. Witness said he could not account for the accident. His theory was that the cable had to be pulled up sufficiently taut to clear the roof of the reservoir, and that he got it too taut. There was a sag of only 5 or 6 feet along a distance of 700 feet. The Jury returned a verdict of "Accidental death."

## SHEFFIELD UNITED GASLIGHT COMPANY.

### The Question of Public Lighting.

The One-Hundred-and-Third Ordinary General Meeting of this Company was held on Monday of last week. The chair was taken by Mr. WILSON MAPPIN, the Deputy-Chairman, in the absence of his father, Sir Frederick T. Mappin.

The CHAIRMAN, in moving the adoption of the report and balance-sheet (which were noticed in the "JOURNAL" for the 21st ult., p. 534), prefaced his remarks by saying he was sure they all regretted that the Chairman was not able, on account of his health, to be present. As they would have seen by the report, the Company's business had progressed very satisfactorily; the increase in gas sold being 96,427,000 cubic feet, or 7·21 per cent., though the income derived from it showed a falling off of £2491. This, of course, was due to the reductions which had been made in the price. During the first three months of the half year, they were selling at 2d., and in the second three months at 1d., per 1000 cubic feet less than during the same periods of 1905; and they were still able to pay the maximum dividend of 10 per cent. per annum, and to carry £1218 to the unappropriated balance, which would thus be £85,190, in addition to the reserve fund of £86,848. During the half year, 1146 tests were made by the Corporation official and the Company's officers, showing the average quality of the gas to be 17·37 candles—the parliamentary standard being 16·50 candles. They carbonized 11,487 tons more coal during the half year. Stokers' wages cost £588 more, and repairs of mains and services £947 odd more; while for coke they had received £3583 more, for sulphate of ammonia £1160 more, and for tar £1523 less, than in the corresponding half year. The gas unaccounted for was 4·47 per cent. Twenty-four additional gas-engines, from ½ to 200 horse power, had been fixed, 426 gas-fires, 925 boiling and other stoves, and 6739 incandescent burners had been sold during the half year, and 314 extra cooking-stoves let on hire. The gas consumed by engines during the twelve months to June 30 was 254,812,000 cubic feet—an increase of 26,203,000 feet. A suggestion was made by Alderman Styring, at the June meeting of the City Council that the Corporation, should light the principal thoroughfares of the city by electricity instead of by gas. Alderman Styring then stated that the Corporation were paying £12,000 a year for gas for lighting the streets. For this sum, he (Mr. Wilson Mappin) pointed out the Company supplied, in about 320 miles of streets, gas to upwards of 10,000 lamps, of which 1200 contained from two to four burners each, and very efficiently lighted the district. Every penny paid for electric light in excess of what was paid for gas, would have to come out of the pockets of the ratepayers; and surely with rates at 9s. 2d. in the pound, as they now were in Sheffield, it would be a mistake to countenance any such extravagance—especially as money was wanted for many things which the town at the present time could not afford. The Gas Company, with a capital of £963,000, and divisible profits of £88,000, paid to the town in rates every year about £18,700; whereas the electric light undertaking, with a capital of £830,000 and a profit of £45,000, only paid £2473. The latter included income-tax. It would thus be seen that the Gas Company, with a capital of only about £130,000 more, and about twice the amount of profit of the electric light undertaking, paid nearly eight times as much to the town in rates. Another thing to which attention might be called was that the Gas Company put the Corporation on their very best terms, and supplied gas to the street-lamps at the lowest price charged to any customer, whether for lighting or for motive power—viz., 1s. 1d. per 1000 cubic feet. The Company also allowed the Corporation to add the consumption of gas at all their various premises together, in order that they might have the advantage of the lowest scale of charge. He understood that the Electric Department charged for lighting the Town Hall and other Corporation buildings at their highest rate. Was it fair that the ratepayers, who were the largest consumers, should be charged in this way? Should they not have the same advantages from their own department as they obtained from the Gas Company? A further point to be borne in mind was that the Company was a very large employer of labour, paying in wages upwards of £82,000 per annum; and that in the production of gas far more labour was employed than in the generation of electricity. In some parts of the City of London electricity had been given up for incandescent gas; and new and important thoroughfares like Aldwych and Kingsway were also lit by gas. Sir William Preece, the eminent electrician, recently advised the Carnarvon Harbour Trust that for outdoor lighting incandescent gas-lamps were better than electricity. The streets of Sheffield were so well lit at present that there could be no good excuse for making any alteration, except to aid the Electric Department at the expense of the ratepayers, which surely could not be sound business. He had too much confidence in the business abilities of the Sheffield City Council to believe that they would so waste the money of the ratepayers. He did not think he could conclude his remarks in a better way than by reiterating the advice Sir Frederick Mappin had so frequently given to the consumers of gas—that was, to keep their burners in good order, and so see that they got full value from the gas they burned. As they were aware, the Company for a small charge sent out men to pay fortnightly visits to consumers' houses, to clean the burners and globes, put on new mantles when necessary, and leave everything in a satisfactory condition. At the end of June, the number of burners so looked after amounted to 19,807.

Mr. B. G. WOOD seconded the motion; and it was carried unanimously.

Mr. SIDNEY SMITH made some comments on the large increase in the use of the electric light in the west-end of the city, saying that it was remarkable under these circumstances that the consumption of gas also increased. He suggested that the Company should adopt the system of installing penny-in-the-slot meters. If this was done, he thought there would be an influx of working-class consumers who otherwise were not able to use gas in their homes. This would mean a large increase in consumption, and would compensate for the falling off in larger houses.

The CHAIRMAN said that Mr. Smith might not be aware that they had a great number of two and three light meters in Sheffield. Out of a total of 83,000 meters, 53,000 were two or three light meters. Gas was sold at the rate of 1s. 5d. per 1000 cubic feet, which was cheap.

The GENERAL MANAGER AND SECRETARY (Mr. Hanbury Thomas) remarked that the working classes in Sheffield were very considerable consumers of gas.

A dividend at the rate of 5 per cent. on the "A," "B," and "C" stocks was agreed to; and a hearty vote of thanks was passed to the Chairman, Directors, and officials.

The CHAIRMAN, in responding, said that he was sorry he could not give the shareholders a good report of his father. He had seen Sir Frederick that morning; and he did not think that there was any improvement in his condition. They might see him at their meetings again; but it was not for him to say.

## METROPOLITAN GAS COMPANY OF MELBOURNE.

### Development of the Prepayment Branch.

The Fifty-Seventh Half-Yearly Meeting of this Company was held on Friday, July 27, under the presidency of Mr. JOHN GRICE.

The CHAIRMAN, in moving the adoption of the report and balance-sheet, pointed out that the credit side of the revenue account showed receipts of £153,387 from the sale of gas, as compared with £147,370 for the same period of the previous year. This was a material increase of £6017. With regard to residuals, the figures for the two half years were almost identical—£34,078, as against £34,052. If they were not to retrograde, it was necessary to push their business; and in doing this, further expenditure had to be incurred. The increases to the debit of the revenue account were due principally to two causes—the extension of the slot-meter system, and the closer supervision that was now being given to the wants and requirements of customers. He was glad to be able to say that the slot meter was proving as popular in Melbourne as in other parts of the world, and large numbers of residents who would otherwise have resisted the Company's efforts to obtain their custom had become ready adherents to the system. As sufficient experience of these prepayment meters had proved that the average quantity of gas that passed through them came up to expectations, the Directors had increased, and were still increasing, the rate at which they were being issued, though they could not yet keep pace with the growing list of applicants. Over 1000 meters of this kind had been installed during the half year in the three districts of Prahran, St. Kilda, and South Melbourne. The somewhat heavy initial cost of the slot meter and its accessories, in the shape of pendants and cooker, had to be considered, as the quantity of gas passing through each was not large. But the system paid its way, and broadened the Company's foundations by substantially adding to the consumption and to the number of the consumers, thus enabling gas to be made more economically. There was little doubt, therefore, that it would gradually develop into a business well worth having; and the Directors fully anticipated that in another twelve months they would be able to show a very considerable increase in consumption through these meters. The other chief cause of increased expenditure—closer supervision over the wants and requirements of consumers—had led to the reorganization of the complaint department, and its amalgamation with the staff at the head office, hitherto solely engaged in doing practical work in the way of repairing stoves, piping, and fitting houses, mantle maintenance, &c. The organization of this department was now complete, and had been placed under an officer known as the Stoves and Fittings Superintendent, who, of course, worked under the Engineers. Mr. Lewis, who was probably well and favourably known to many of them as head of the Stove Department for a number of years, was selected for the new position; and he had fully justified his appointment by the enthusiasm his example had inspired in those associated with him. It was pleasing to the Directors to be able to pay a high compliment to the men attached to this department, who were, as a whole, taking great interest in their work, and doing it thoroughly, and by that means—as they were continually in touch with the public—putting the Company on very much better terms with gas users than had ever previously been the case. To show the importance of this branch, he might mention that the Stoves and Fittings Superintendent had under his direct control 107 men and youths. By combining the two separate departments, much overlapping of work was prevented; and they had five or six men who possessed a knowledge of cooking, for the purpose of examining stoves and explaining to consumers at their homes how to obtain the most efficient and economical results. The Company were continuing the free cooking classes, and were prepared to send their experts to consumers whenever their services were required. The greatest trouble was found to be the defective and bad fittings met with, over which the Company had no control at all. As many of these fittings involved escapes, they were accountable for a large proportion of the complaints made of unsatisfactory gas supply. In order, therefore, to give greater and more prompt attention to customers, they had divided the area of supply into five districts, each of which was in charge of a foreman, and had formed ten working depôts situated in central and convenient positions, and connected by telephone with the head office. This had proved a great success. The Company also undertook the control of incandescent burners and mantles under what was known as the full maintenance system, which, for rates averaging about 4d. per burner per month, provided for renewal of mantles, chimneys, &c., and cleaning and adjusting burners at least once a fortnight. For inspection only (the consumer paying for any new mantles and other accessories required), the charges were 1½d. to 2d. per burner per month. As these systems became more generally known, it was thought that greater advantage would be taken of them by consumers, for they were not worked by the Company with a view to profit—as a matter of fact, they actually resulted in a loss—but with the object of ensuring satisfaction with their method of illumination. Turning again to the balance-sheet, the shareholders would perceive that the amount brought forward to net

revenue account was £74,045, to which had to be added interest earned £663, making, with the balance of £2859 brought forward from last half year, a total of £77,567. From this amount had to be deducted interest on debentures £20,385, leaving a balance of £57,182 to be dealt with. Out of this sum, gas-stoves account required £2000, meter renewal fund £1000, and reserve fund £9000. At the last meeting, he informed them that the Full Court had found in favour of the Company's contention in regard to the "maximum demand" system of charging for electricity adopted by the City Council, in addition to their ordinary method—the "flat" system; but that the City Council had given notice of their intention to appeal against the decision to the High Court of Australia. As the Acts governing the operations of both the City Council and the Metropolitan Gas Company each contained a provision framed for the purpose of enforcing uniformity of charge, the Directors, notwithstanding that they had been successful in the Full Court, joined with the City Council in endeavouring to get a short Bill passed which would have allowed each undertaking to have equal privileges as to charging. After having been introduced by the Government, the measure was, at the request, the Directors believed, of the City Council, withdrawn on the last day of the parliamentary session. Since that date the High Court had given their decision, reversing the judgment of the Full Court; but the Directors were now applying to the Privy Council for leave to appeal to that tribunal against the High Court's decision, which, as it at present stood, was inimical to the shareholders' interests. The three years' contract for the supply of coal would expire on March 31 next; and, following a long-established practice, the Directors called for tenders for a three years' contract twelve months' prior to the termination of the existing one. Negotiations were, however, then taking place for the formation of a combination of the colliery proprietors; and no tenders were received in response to the advertisement. In addition to this, one could not avoid thinking that there was a general feeling of unrest at Newcastle. There was also an increase in the demand for coal; and this, combined with the claim of miners for higher wages, was expected to have its effect on prices.

Mr. LUXTON having formally seconded the motion,

The CHAIRMAN, replying to a question, said there were over 3000 slot meters in use, and the number was being increased at the rate of between 60 and 80 per week. As to the electric lighting dispute, he explained that the Directors of the Gas Company were as much adverse to law proceedings as any individual member of the Company. Leading shareholders had waited upon some of the principal members of the City Council, but were given to understand there was no chance of settlement being effected except through the process of law. The Directors were fighting to have each competitor in lighting placed on level terms; and they did not think it was the intention of the Legislature that it should be otherwise.

The motion was agreed to; and a dividend of 5s. per share was declared out of the half-year's profits.

## AUSTRALIAN GASLIGHT COMPANY.

The Half-Yearly Meeting of this Company was held at the Royal Exchange, Sydney (N.S.W.), on July 30—Mr. GEORGE J. COHEN, the Chairman, presiding.

The ACTING-SECRETARY (Mr. F. E. Williams) having read the advertisement convening the meeting, the report of the Directors was taken as read. This stated that the profits for the half year to June 30, after making provision for bad and doubtful debts, deducting interest on borrowed money, repairs and renewals, depreciation of plant, working expenses, and all other charges, with the balance brought forward, amounted to £66,798. The Directors recommended the payment of a dividend for the six months of 9s. per share on the old shares, and in proportion on the new shares, free of income-tax, which would absorb £59,971, and leave a balance of £6827 to be carried forward to the next account. The Engineer (Mr. T. J. Bush) reported that the whole of the Company's plant was in excellent condition. The Secretary (Mr. R. J. Lukey), who was in England on short leave, hoped to obtain a good deal of information which would be of value to the Company. The popularity of penny-in-the-slot gas-meters was still maintained; the number of houses supplied to date being no less than 23,161.

The CHAIRMAN, in moving the adoption of the report and balance-sheet, said that the operations of the Company had proved very satisfactory, showing additional business in respect of sales of gas, and also more favourable prices for residuals. Expenses were a little heavier, owing to the higher wages paid to the men under the Arbitration Act, and also the increased quantity of coal used for the larger output of gas. The increasing demand for gas in the suburban districts had engaged the attention of the Directors; and the substitution of large mains for existing smaller ones, as well as extensions farther afield, had been rendered imperative. Two of the adjacent boroughs were contemplating the advisability of installing the electric light. The Lord Mayor, in a minute a few days ago, explained the cause of the increased cost of lighting the city by saying that a "portion was due to the Gas Company having raised their price for street-lamps because the Council rated their mains." This was so. The Company increased the price of the lamps in the city in July, 1904; and the additional amount received by them to date was £4000. The Council, however, rated the gas-mains in 1902; and since that time £10,000 had been paid by the Company. The city funds, therefore, had benefited to the extent of £6000. It was satisfactory for shareholders to know also that the Lord Mayor felt that the Council could not claim that for the increased cost of street lighting—viz., £6700—they received superior service. The Chairman then proceeded to give a comparison of the cost of gas and electric light in London and elsewhere, and concluded by stating that he considered he had said enough to show that the tendency to extend electric lighting had been checked partly by its costliness and partly by the improvements which had enabled the gas companies to give a better light at a cheaper rate. In New York, where the relative merits of the two systems were well understood, very extensive gas-works had lately been erected; so that in both the old world and the new confidence was being exhibited in gas undertakings, the business prospects of which were increasing enormously. The number of public lights now in use was 10,381; being a slight decrease on 1905. In the suburbs, there had been an increase of 164 lights; but owing to electric light extensions in the city, about 170 lamps had been discontinued, leaving in the latter district 1869 lamps lit by gas. Gas-cooker sales showed an increase of 1150; making 14,016 sold by the Company to date. There were 719 gas-engines in use throughout the city and suburbs—an increase of 13. The day consumption of gas had reached 44 per cent. of the total deliveries. The number of consumers was 72,132, showing an increase of 4117 on the previous year. There had been 116 miles of mains and services laid during the year; the total mileage to date being 2063.

The report and balance-sheet were adopted.

## HARROW AND STANMORE GAS COMPANY.

### Unprecedented Increase in Consumption and Reductions in Price.

The Ordinary Half-Yearly Meeting of this Company was held last Tuesday, at the Albion Tavern, Aldersgate Street, E.C.—Mr. A. H. BAYNES in the chair.

The SECRETARY (Mr. J. L. Chapman) read the notice convening the meeting; and the Directors' report and the statement of accounts were taken as read.

The CHAIRMAN, in moving their adoption, said there were in the report two or three matters to which he should like to refer. The first was that the Gas Companies' Bill for the removal of the sulphur restrictions had received the Royal Assent, and so had now become law. This very distinct benefit to the Company had only cost them, as their share, the trifling sum of £12 12s. 3d. The second point to which he should like to allude was that, during the half year, the price of gas had been reduced by 3d. per 1000 cubic feet in the outer area of the district, and by 1d. in the central area; so that now there was one uniform price over the entire district. The total value of these reductions might be taken as roughly £300 for the half year under review. The third fact was that their consumers would also be further pleased to hear of the recent resolution of the Directors that, in view of the present position of the Company, the increasing demand for gas, and the removal of the sulphur restrictions, an additional reduction of 2d. per 1000 cubic feet in price was to be made from and after the date of next Christmas quarter—bringing down the price of gas throughout the district to 3s. 9d. per 1000 cubic feet. Finally, with regard to the facts mentioned in the report, for the first time in the history of the Company, the dividend recommended on the original shares was the full standard one to which they were entitled. Turning next to the accounts, the proprietors would be pleased to hear that the gas-rental for the past half year, as compared with the corresponding period of 1905, exhibited an increase of £1096, notwithstanding the reduction in price representing something like £300. The receipts from fittings, and meter and stove rentals, showed an increase of £176; and from residuals of £197—due largely to the extra coal carbonized, in consequence of the larger make of gas. The gross receipts for the half year had been £15,128—an increase of £1460. The total expenditure had been £10,155—an increase of £1036. This was easily explained when it was remembered that 413 tons more coal had been carbonized, and 7337 gallons more oil had been used, at an additional cost of £446. Repairs and renewals of meters and stoves presented an increase of £410, compared with the corresponding period of 1905, due chiefly to an extra amount having been written off for depreciation. Repairs to mains had involved an increase of £146, owing to the writing off of the cost of small mains and replacing them with larger ones. The quantity of gas sold in the half year had been 61,535,000 cubic feet, or more than in the first half of 1905 by 6,924,000 cubic feet—an increase of 12½ per cent. This increase had been very evenly distributed over the whole of the Company's district. The amount of gas made per ton of coal had been 10,730 cubic feet; and the oil used per 1000 feet of carburetted water gas was 2·86 gallons. The carbonizing wages for the half year had amounted to 1·64d. per 1000 cubic feet of gas sold; and the fuel used was 17 per cent. of the coke made. The total profit on the half year had been £4970. From this had to be deducted £566 for debenture interest; while the standard dividends recommended by the report would need £4206—leaving a balance in hand of £206, which would be added to the balance of £2833 brought forward from the December half year, and make the total balance carried forward £3039. He thought the proprietors might congratulate themselves upon the position of the Company. In his opinion, this was the most satisfactory and encouraging report that had ever been presented in the Company. For this they were, he thought, largely indebted to their enterprising and hard-working Engineer, Mr. Chapman.

Mr. A. F. PHILLIPS seconded the motion, which was unanimously carried.

Proposed by the CHAIRMAN, and seconded by Mr. HORACE J. RYDON, a dividend was declared at the rates per annum of 10 per cent. on the original "A" capital, and 7 per cent. on the additional "B" and "C" capitals and guaranteed shares, less income-tax.

Mr. PHILLIPS moved a vote of thanks to the Secretary and Engineer, to whom he said they were greatly indebted for the results of the present balance-sheet. He (Mr. Phillips) had frequently visited the works, and knew of the attention Mr. Chapman gave to the business and to the alterations that he had in view. The works were now very different ones from what they were some years ago—they were, in fact, quite model works. The results obtained were also satisfactory in comparison with any other undertaking.

Mr. F. R. SMITH, in seconding, corroborated all that Mr. Phillips had said.

The motion was heartily passed.

Mr. CHAPMAN, in the course of his acknowledgment, said he was himself extremely pleased with the wonderful manner in which the Company had gone forward. It was altogether beyond his expectations. He had entertained the hope that some time they might get to the current price of gas; and in the hour of their success one could not help regretting that their late Chairman (Mr. Glaisher) was not alive to see the 10 per cent. of which he had so often spoken. He felt with Mr. Phillips that the works were indeed model ones; and with the alterations they were making this year, he believed he might, in all modesty, say they would be perfect ones. The inclined retorts had turned out magnificently, and had produced the best results, he believed, of any Company of their own size. He thought they would still go forward; and they had great expectations that the time was not far distant when they would be able to make a further decrease in price, thereby benefiting both consumers and proprietors.

Mr. A. W. OKE, in moving a vote of thanks to the Chairman and Directors, congratulated them upon the passing of the Removal of Sulphur Restrictions Act, by which they had escaped from onerous conditions at such a very small charge.

Mr. F. LENNARD seconded the motion, which was cordially carried.

The CHAIRMAN having thanked the proprietors for the kind reception given to the resolution,

The proceedings terminated.

## DISAPPOINTED GAS COMPANY SHAREHOLDERS.

### The Results of the Crowborough Promotion.

Disappointment and not big dividends is the lot of the shareholders of the Crowborough Gas Company. It is not what they were led to expect; but it is what they have so far realized, as is seen by the report of the proceedings at the general meeting held on Thursday, at Crowborough. At the preceding half-yearly meeting in April, the position was found to be so unsatisfactory that an Advisory Committee was appointed. At Thursday's meeting, the shareholders had the report of the Committee before them, as well as that of the Directors, and the documents have been published in the "Kent and Sussex Courier." It was evidently not thought expedient by the Directors to send copies to the "JOURNAL;" and therefore we have had to fall back upon our contemporary.

The report of the Advisory Committee was as follows: At the half-yearly meeting of the Company, held on April 5 last, a Committee of five shareholders was appointed to advise as to the issue of debentures; to ascertain the present position, prospects, and possibilities of the Company, and the best means of raising additional capital for carrying out certain works; to confer with the Directors, and, if necessary, to report to the shareholders. The Committee have given the most careful attention to these subjects, and beg to report as follows: That the existing debentures had become payable; and the holders were in a position to enforce their rights. The Committee recommended that a new issue be raised to replace these; and it is most satisfactory to learn that the whole of this issue has been allotted to shareholders in the Company, and thus the interests of both share and debenture holders are now identical. An inspection of the books proved that the amount paid for the undertaking far exceeded its value. The sum of £1900, the cost of the public issue at the formation of the Company, and which was charged to the vendor as part of the purchase price, is, in the opinion of the Committee, an extravagant amount to spend in the promotion of so small a Company. The Committee are firmly convinced that many economies might reasonably have been effected by the Directors in the management of the Company, and to the benefit of the shareholders. Among others, of the first importance, is the purchase of coal on the most advantageous terms; and this seems to have been disregarded or overlooked by the Directors. The report for the year 1905 states that 1300 tons of coal were used, on which, had due care been exercised, there would have been a saving of at least £300 in this one year. The plant laid down is not of a nature conducive to the economical production of gas. The Committee are of opinion that the existing plant might with advantage be modernized in some respects, and strongly urge that an independent gas manager be asked to advise as to the future management of the Company, and the best means to be adopted to put the works into an efficient state and condition, especially bearing in mind the opportunities for extension that the district readily commands. There is every reason to believe that a great saving can be effected by this means. It should be pointed out that the present capital is nearly exhausted; and great care should be exercised in any further expenditure under this heading. It is suggested that, on receipt of the proposed expert opinion, an early opportunity should be taken of bringing the same before the shareholders. In conclusion, the Committee have great confidence in stating that, with the exercise of economies (as outlined above) and careful management, the undertaking could at an early date return a satisfactory dividend on its capital.

The Director's report was as follows: In presenting the seventh annual report and accounts, the Directors are pleased to be able to record a continued steady increase in sales of gas and residuals, as shown by the following figures: Gas—1904, £2197; 1905, £2322; 1906, £2544. Residuals—1904, £393; 1905, £396; 1906, £471. During the year, the plant and works have been carefully overhauled and are now working at their full capacity, rendering it necessary to carry out the suggestion of the Engineer that the retorts should be enlarged, an exhauster installed, and the storage capacity increased. The available balance enables the Directors to recommend a dividend at the rate of 1½ per cent., which will require £352 14s. 8d., and to carry forward £45 17s. 8d., which although small will compare favourably with the seventh year of many larger companies. A copy of a report which has been sent to the Directors by the shareholders who were nominated at the last general meeting to advise as to the issue of debentures, accompanies this report. With reference to the remark that an inspection of the books has proved that the amount paid for the undertaking far exceeds its value, it is difficult to understand how this remark can be substantiated from a casual inspection of the books, bearing in mind that the sum paid by this Company included not only the value of the undertakings, but the expenses of obtaining the Company's Act of Parliament and various other matters; and the sum paid on making the public issue of the Company's capital was, in the Directors' opinion, in every way justified. Respecting the suggestion that many economies might be effected by the Directors, a reference to the balance-sheets which have been issued will show that the business of the Company is worked on the most economical lines; the aim of the Directors being to keep the working expenses as low as possible consistent with a proper carrying on of the Company's business. The statement in the report that at least £300 a year could have been saved in coal is one the Directors feel should not have been made, as they have always purchased coal at the lowest possible price. It should be borne in mind that cheap coal cannot yield the same quantity of gas as more expensive coal, nor can residuals to the same extent be obtained. The Directors have recently obtained quotations from various coal merchants with a view of trying to ascertain upon what basis this statement was made, but found on a comparison of prices that coal of the same quality as used by the Company could not be obtained at any better price. The Directors have had before them, and have so stated at one, if not two general meetings, that in order to cope with the growing demand for gas, the works would have to be extended, and additional capital authorized for this purpose; and they are quite willing to consider any suggestions that may be made in connection with these expenses, but are strongly of opinion that no good results would follow from an expenditure of money in altering the present works, beyond, as previously mentioned, enlarging the retorts and installing an exhauster, which can be done by the issue of the remainder of the Company's capital.

The CHAIRMAN, in moving the adoption of the report and balance-sheet, said the revenue was fortunately increasing; but they were unable to recommend the payment of a higher dividend than 1½ per cent. The important thing to be discussed was the question of the improvement of the works, which was mentioned in the report of the Advisory Committee. The Directors felt it necessary for them to take some cognizance of the report in their own report to the shareholders. Economy in gas-making was an important factor; and without hesitation the Directors declared they had given the gravest consideration to the question. The works were not of the most modern kind; but the Directors had to deal with them as they found them when they were appointed Directors. He did not think they could be accused of extravagance. The suggestion that they should be reported upon by a gas expert was an excellent one; but an expert would no doubt suggest this, that, and the other thing, and it was a question whether money should now be spent on small improvements, saved for the extension of works which would be imperative in the near future. In their report, the Advisory Committee said that a saving of £300 could have been effected on the coal bill last year; and the Directors awaited with some curiosity an explanation of this statement. They had always bought their coal at the best possible prices.

Mr. TROY thought an explanation of the statement that £300 could have been saved on coal should be given to justify the report of the Committee.

Mr. R. HOWARD said there was no doubt the Company was largely over-capitalized. It had been proved from the experience of all the companies in the United Kingdom that the amount of capital needed per million feet of gas produced was £860. The capital of the Crowborough Company was £30,000; and its production 12 million feet, which worked out at the large figure of £2500 per million.

Mr. G. W. HOWARD remarked that he believed he convinced the Advisory Committee that he was justified in making the statement that £300 could have been saved. The coal used by the gas companies in the South of England was invariably sea-borne from the Durham coalfields, which was cheaper than the inland coal, which he believed the Company used. Ten miles off, the Uckfield Gas Company had gas coal taken to their works at under 16s. a ton, and made 10,500 cubic feet per ton from it. The Crowborough Company paid 22s., and made 8611 cubic feet. Allowance of a 1000 cubic feet per ton must be made for the absence of an exhauster, and this brought the amount up to 9611. Even then the Crowborough output was nearly 1000 cubic feet per ton less than Uckfield. If this could be done at Uckfield, he wished to know why it could not be done at Crowborough.

Mr. PAINTER (the Engineer) explained the method of making contracts for coal; and said that new tenders had been invited, but the same quality as they used could not be obtained at a lower price.

Mr. HOWARD considered too much attention had been paid to unremunerative extensions of mains. Over 100 tons more coal had been used than would be necessary with an exhauster. Where, he asked, was the management there?

The ENGINEER: The management is all right.

Mr. HOWARD: Is it? We are working at a great disadvantage through having no exhauster.

A SHAREHOLDER thought the trouble was that the Directors were connected with so many other companies.

Mr. NORTHOVER suggested that until the Company paid a dividend of 5 per cent. the Directors should accept half their present fees of £25 each.

In reply to a question, the Auditor said he did not think the amount allowed for depreciation of meters, stores, and tools was sufficient.

Mr. BEALE suggested that in view of this no dividend at all should be paid.

Finally, the report of the Directors was carried, omitting the latter portion commencing "With reference to the remark," and adopting the paragraph in the Advisory Committee report commencing, "That the Committee are of opinion," &c.

It was decided that the dividend should only be at the rate of 1 per cent, instead of the 1½ per cent. recommended by the Directors.

Messrs. Barnes and Painter retired from the Board, and offered themselves for re-election; but the meeting elected Messrs R. Howard and E. Catchpole, who signified their willingness to accept half fees.

## PROVINCIAL GAS AND WATER COMPANIES.

### A Good Increase at Aldershot.

Addressing the shareholders at the half-yearly meeting of the Aldershot Gas and Water Company, the Chairman (Mr. A. F. Wilson) pointed out that in the six months to June 30 the expenditure had been only £37 in excess of that in the corresponding period of the previous year, while they had sold about 6¼ million cubic feet of gas more; and notwithstanding a decreased price of 3d. per 1000 cubic feet to ordinary consumers in the outlying districts, and a reduction of 1d. to ordinary and slot-meter consumers in Aldershot, the Company had realized a revenue £500 in excess of the same period of 1905. This, he said, was very satisfactory. They had not only made this large extra quantity of gas without any increase of moment in the cost, but they had covered a considerable diminution in price by the increased quantity sold. Another important point in the revenue account this half year was the increased profit arising from the manufacture of sulphate of ammonia. This residual represented a profit for the six months of £866. In the corresponding period of 1905, it was £692; and in the December balance-sheet, it was only £433. They had therefore doubled the profit of their December half year, and they had added considerably to the amount realized during the six months ending June, 1905. This increased profit had been partly due to a very small rise in the price; but it was owing chiefly to increased manufacture. And now, with reference to a question that had been argued for a long time, he was happy to be able to inform the shareholders that the much-debated 20 cwt. of sulphate of ammonia per 100 tons of coal carbonized had been attained; and he was convinced that it was likely to be maintained in the future. The water revenue was practically the same as in the first half of 1905. At the present time they were charging for gas 2s. 7d. per 1000 cubic feet to the ordinary consumers in Aldershot; and this was, with one or two exceptions, the lowest price charged in what might be called the South of England. When they reflected that Aldershot was an inland town, and that railway rates had to be paid for all the coal used, whether taken from London, Southampton, or direct from the colliery districts, he thought that it was very satisfactory indeed, not only to the Aldershot consumers, but also to consumers in the large district outside, that the Company were able to fix the rate in Aldershot as low as 2s. 7d. But at the same time, he could not fail to recollect that many years ago the price of gas in Aldershot was only 2s. 6d. It was owing to the costly parliamentary struggles of the Company since 1896 that this rate of 2s. 6d. had not been reverted to, or an even lower figure fixed. When they went to Parliament again, as he had no doubt they would do in the course of years, he hoped the consumers and the public generally would take a much broader and a much more reasonable view of the Company's action in relation to themselves, and of the mutual understanding which was necessary between them. The report and balance-sheet were adopted; and a vote of thanks was passed to the Chairman, Directors, and staff. In acknowledging the compliment on behalf of the latter, Mr. R. W. Edwards, the General Manager and Secretary, referring to a remark by the Chairman that, in consequence of the opposition of the Local Authorities, the public of Aldershot were paying practically 4d. per 1000 feet more for their gas, said this represented a loss to the consumers of not less than £1000 a year; and it hit the shareholders also, because if they could have supplied gas at 2s. 3d., they would have paid 12s. per cent. more dividend upon the ordinary shares. Before the close of the ordinary meeting, the Chairman mentioned that he had received from his colleagues on the Board a very handsome present to mark his 25 years' connection with the directorate—a present of which he was very proud. He was also proud that he had been able to serve the Company for so many years. He took the opportunity of telling the shareholders that his colleagues had shown that his services had not passed unnoticed. The dividends recommended were at the rate of £11 16s. per cent. per annum on the "A" shares, £8 16s. per cent. per annum on the "B" shares, and 7 per cent. per annum on the "E," "F," and "G" ordinary shares, for the half year—all less income-tax. At a subsequent extraordinary meeting, the Directors were given authority to issue further share and loan capital.

### An Uneventful Year at Dover.

Addressing the shareholders of the Dover Gas Company at the half-yearly meeting on Monday of last week, the Chairman (Mr. W. Mannering) said that the past six months, though successful, had been uneventful. There had been a slight decrease of 233,000 cubic feet in the consumption of gas; but it must not be thought that they were going back, or even standing still. During the twelve months to June, they gained 179 prepayment and 4 ordinary consumers; and they were also extending their mains. Since the commencement of the current half year, there had been a steady increase in the consumption. The net result of the half year, after providing for interest on loans and the transfer of £250 to the gasholder suspense account, was a profit of £3562, which would pay the statutory dividend at the rate of 7½ per cent. per annum (less income-tax), and leave £626 to be added to the surplus balance of £3519 brought forward from the previous accounts. The report was adopted; and the thanks of the meeting were accorded to the officers—the proposer remarking that he knew of no company which was so well managed and had such an excellent staff in every department.

### Expansion at Enfield.

Sir Alfred Somerset, K.C.B., the Chairman, presided over the recent general meeting of the Enfield Gas Company; and, in moving the resolution relating to the accounts, he said the extension of the business as revealed by them might be characterized as highly satisfactory. In the half year £3581 had been spent on mains, service-pipes, meters, and cookers; the other item of capital expenditure (£446) being the amount chargeable in the six months for new buildings being put up in the immediate vicinity of the office to furnish increased accommodation. To provide the necessary capital funds, the Directors had issued £10,000 of consolidated ordinary stock. Of this, £1980 was disposed of at prices ranging from £107 to £108 per cent., under tenders invited from the general public in the prescribed manner. The remaining £8020 of stock was offered to the existing holders of ordinary stock, the consumers, and the employees of the Company, at the reserve price of £107; and there were applications for £27,846—a subscription of nearly three-and-a-half times the amount to be allotted. The consumers, as before, availed themselves of the opportunity; so that at the time of speaking, out of a total of £120,280 of consolidated ordinary stock issued, nearly one-half was in the names of ratepayers of the parish of Enfield. At the end of 1905, the capital account was in debt to the amount of £4096; while a further £4027 had been spent in the half year under review. As £10,687 was raised by the sale of the new stock, the floating capital in hand to begin the new half year with was £2564. The Directors pursued a forward policy in the methods employed for further popularizing gas, and were, he believed, the pioneers in a new departure in this branch of business, as they had placed the services of an expert cook at the personal disposal of those of the consumers who use gas cooking-stoves, to give advice and instruction at their own houses—not only in the technicalities of cookery, but in the economical use of gas for the purpose. Seconding the resolution, Mr. Alfred Ford said the total number of consumers had increased in the half year from 6313 to 6649, the public-lamps from 835 to 850, and the gas-cookers fixed from 4235 to 4951. Compared with the corresponding half of the previous year, 494 tons more coal had been used, and the sale of gas had increased by 6,860,000 cubic feet (which was at the rate of 9·26 per cent.). In the six months, 10,525 cubic feet of gas had been sold per ton of coal carbonized. The rental for gas meters, stoves, and fittings had increased by £1471; but residuals were less by £107, owing to the drop in market prices—principally of coke, the average sale price of which was lower by 1s. 11d. per ton than last year. The amount expended in the half year for supplying and fixing pipes and fittings in houses where coin meters were installed, was £1042. The Directors decided to charge £110 to revenue on this account, so that the outstanding balance of the prepayment house-fittings account was slightly less than at the beginning of the half year. Dividends at the rate of 5 per cent. per annum on the consolidated preference stock and of 5½ per cent. per annum on the consolidated ordinary stock (less income-tax) were declared; and a reduction was announced of 1d. per 1000 cubic feet in the price of gas, to take effect from the next quarterly reading of the meter indices. Mr. J. P. Widdicombe, J.P., congratulated the Directors upon the results, and the satisfactory condition of the undertaking exhibited by the accounts, and gave notice of his intention to bring forward the subject of the remuneration of the Directors and the salary of the General Manager and Secretary (Mr. C. W. Offord) for consideration at the next general meeting.

### Prospective Capital Requirements at Falmouth.

When addressing the shareholders at the sixteenth annual genera meeting of the Falmouth Gas Company, the Chairman (Mr. John Mead) said he thought they might regard the accounts as very satisfactory—about the most satisfactory in the history of the Company. The report showed exactly what the Directors had in their eye for some time—that was, to make a large profit, and be able to put some of it to the reserve fund, which was now in a very good state. The capital account was running out; there being at present only £785 unexpended. This amount would certainly have to be increased within the next twelve months, because they had acquired property close to the works. Last year the Directors reported the purchase of the sea portion of this property; and recently they bought the land part of it—four houses immediately adjoining the works. So that, though they possessed a satisfactory balance, it would be necessary to enlarge the capital account; and the wisest course, perhaps, would be to increase it by £20,000, to meet the requirements for a long course of years. In an undertaking of this sort, he considered the need of further capital a healthy sign, provided there was an increase in the manufacture of gas. They had not in the past year had quite the usual increase of 5 per cent. in the output; but when they had to contend with a continued extension of the incandescent system of lighting, the consumption was very satisfactory. With the help of the new Manager (Mr. H. H. Hoare), the Company had reduced the cost of the manufacture of gas by something like 1d. per 1000 cubic feet. This reduction did not seem large; but it meant something to accomplish throughout the whole year, and it was from this as much as anything that the increased profit had been derived. When a new Manager coming into a strange place produced such an account as Mr. Hoare had done, it induced the feeling that they had the right man; and the Directors were very glad to be able to report that they looked upon him as a very satisfactory servant of the Company in every way. The report was adopted; and a dividend of 5 per cent., less income-tax, for the half year to June was declared (an interim dividend of 5 per cent. for the previous half year having been already paid). In addition, 1 per cent. (the balance of the statutory dividend) was placed to reserve.

### Progressive Business at Richmond.

In the report presented at the recent half-yearly meeting, the Directors of the Richmond Gas Company congratulated the proprietors on the satisfactory state of affairs revealed by the accounts. The Chairman (Mr. T. J. Carless), in the course of his remarks, said that most of the expenditure was normal; but repairs and maintenance (manufacture) showed an increase of close upon £300—this sum having been expended in altering some of the carbonizing plant to a more modern system. As to the receipts, they had to record an increase from sales of gas and meter and stove rents, which, though not large, showed that the Company's business was a progressive one. But there was no doubt they were still feeling the effect of the incandescent burner, which gave much more light with a smaller gas consumption. On the other hand, however, the Welsbach burner had given them the best and cheapest means of light; and they had only praise and thankfulness for its extended use. The amount received for maintenance of incandescent burners had now reached nearly £200 per annum; but coke had sold badly, and the prices obtainable for sulphate of ammonia had also been unsatisfactory. The profit and

loss account showed a healthy state of affairs, with a good amount carried forward. Cash on deposit and current account totalled close upon £10,000. The dividend recommended was at the rate of 5¼ per cent. per annum on the consolidated ordinary stock for the half year. The report was adopted; and votes of thanks were accorded to the Chairman and Directors, and to Mr. Thomas May, the Engineer and Secretary, and his staff.

**A Strong Balance-Sheet at Shrewsbury.**

The annual meeting of the Shrewsbury Gas Company was held on the 1st inst., when the proprietors showed their appreciation of the satisfactory condition of the undertaking by increasing the remuneration of the Directors. The report stated that the profit on the year's working amounted to £8364. An interim dividend of 2½ per cent. was paid in March; and the Board recommended that a final dividend of 3 per cent. (making 5½ per cent. for the year, to which the Company were entitled under the sliding-scale) should be declared. This would leave a balance of £1804 to be carried forward. The reserve fund now amounts to £10,110. There was an increase of over 5½ million feet in the consumption of gas during the year. The number of stoves on hire at June 30 was 2464, an increase of 145 in the year; and the number of slot meters was 3001, or an increase of 185. The Directors expressed their deep regret at the loss of their colleague, Mr. W. Beacall, who died in November last, after thirty years' valuable service as a Director, during twelve years of which he was Deputy-Chairman. The Chairman of the Company (Mr. J. Spencer Phillips) was unable to be at the meeting; but he sent some remarks on the report which were read by the Deputy-Chairman (Mr. T. F. Poole). In the course of these, he said that he had often had the pleasure of laying before the shareholders satisfactory accounts of the working; but never before had the Board been able to present such a strong balance-sheet as on the present occasion. Having dealt with the passing of the Sulphur Restrictions Removal Act and the purchase of the freehold of the Company's offices, Mr. Phillips referred to the accounts. He said they had carbonized during the year 371 tons more coal, which was an increase of 2·096 per cent. They had made 6,430,000 feet more gas, or an increase of 3·44 per cent.; and they had sold 5,690,000 feet more, showing an increase of 3·29 per cent.—all of which, coming on the top of the large increases of previous years, was most satisfactory. The unaccounted-for gas had been reduced from 6·03 to 5·92 per cent.; and they hoped, with the help of their able Manager (Mr. William Belton), during the coming year to make a further reduction under this head. The total receipts from gas, notwithstanding that they had reduced the price 1d. per 1000 feet, showed an increase of £57; and they had received from the slot meters alone £318 more, in spite of this reduction. The convenience and economy of the slot meter were daily becoming more appreciated by the smaller consumers; and the same might be said with equal truth of the advantage of cooking by gas—the number of stoves on hire having increased by no less than 145 during the year. There was a rather considerable falling off in the amount received from the sale of coke, which at one portion of the year was somewhat of a drug in the market; but this had been almost entirely recouped by the better price obtained for some of the other residuals. The Board had notice that the Assessment Committee of the Atcham Union were going to make a re-assessment of the works, mains, premises, &c. Therefore they had been most carefully valued by assessors on both sides; and after a very exhaustive inquiry into all the figures, there was a probability of an agreement being arrived at which would save the expense of a prolonged arbitration. But, as unfortunately always was the case, the Company had to submit to a rather increased assessment. The net result of the year was that they were enabled to pay a dividend of 5½ per cent., or ¼ per cent. more than last year—which they were entitled to have under the sliding-scale—and this was equivalent to 8¼ per cent. on the old stock. The report was adopted, and the dividend recommended was declared.

**Progress at Southend.**

The half-yearly report of the Southend Gas Company referred with regret to the death of Mr. Charles Woosnam, who had been connected with the Company since its inception as a Director, and had for 23 years acted as Chairman. The sale of gas, compared with the corresponding half year, showed an increase of 11·69 per cent. The total number of consumers on June 30 was 9461, of whom 6047 were on the prepayment system. The profit and loss account showed a net amount available for dividend of £9242; and it was recommended that payment of dividends be sanctioned at the rate of 5¾ per cent. per annum on the original consolidated and new ordinary stocks, and 5¾ per cent. per annum on the new ordinary "B" stock (all less income-tax), leaving £3624 to be carried to the next account. Moving the adoption of this report at the meeting, the Chairman (Mr. C. Frank Woosnam) congratulated the shareholders on the progress of the Company. He said the increase of 12 million cubic feet in the quantity of gas sold, as compared with the corresponding period of the previous year, was most satisfactory. During the past year, there were 831 new consumers—79 ordinary and 752 prepayment; and the Company had fixed 723 new cookers, making the number at June 30 5863. Since that date 554 new consumers had been added and 365 cookers fixed, showing that the public were alive to the advantage of gas-stoves in the very hot weather they had been experiencing. In the past half year they had fitted up 832 houses with prepayment fittings, and laid 785 service-pipes and 4039 yards of new main; bringing the total length up to 54 miles odd. This was the greatest length of main that they had ever laid in one half year. The work had not been done without a great deal of forethought by the Board, who were quite convinced that as the town developed the Company would be well repaid for the outlay. This development, all were quite satisfied, was bound to continue if the rates were kept down to a reasonable sum. At the present time, they came rather heavily on the Company, who were contributors to the tune of something over £1300 a year, besides a little help in pier dues of between £300 and £400. For the last ten years they had been spending money freely—in fact, building up a fine business—in fitting up houses and laying mains which for a time were unproductive. Now, however, the roads were filling up; and as years went on, they would get their reward. Mr. James Randall, the Deputy-Chairman, seconded the motion; and it was adopted. The payment of the dividend recommended was also agreed to.

**Increased Business at Sunderland.**

The report of the Sunderland Gas Company, which was adopted at the recent annual meeting, stated that the total revenue for the year ending June 30 was £120,234. The expenditure was £104,489, which left a balance for the year of £15,744. An interim dividend was paid in March; and the Directors recommended the declaration of a like dividend of 5 per cent. on the original stock, and of 4¼ per cent. on the additional capital stock of the Company (less income-tax). During the year 680 ordinary and 3369 prepayment meters were fixed. In order fully to meet the increased demand for gas, the Directors deemed it advisable to reconstruct and enlarge the Ayres Quay Station, which was well situated for supplying the western district, where the largest increase was taking place. Plans to carry out this object had been approved by the Corporation. The Directors much regretted the death of their late colleague, Mr. G. R. Booth, who, as a Director, and recently as Chairman, rendered good service to the Company for the long period of 27 years; and they reported that they had elected Mr. Stansfield Richardson as Chairman. In addressing the shareholders, Mr. Richardson said he ventured to anticipate that they would regard the report as satisfactory. Apparently the Company had done more business, and could show an increase in the sale of gas as a lighting and a motive power. They were still able to pay the maximum dividend, notwithstanding the keen competition of electricity. These were gratifying and noteworthy points. It was true that they had not made so much money as the two preceding years; but these two years were record ones. They had, however, made more than the average for the past seven years, which included the two record years referred to. They had to pay a little more for coal than in the previous year; but they had very satisfactory contracts, and he might claim that the Board were well advised by expert knowledge in the coal trade. Residuals were a fluctuating quantity; and coke had not followed coal as they would like to have seen it. The mild winter had affected them somewhat; but he thought they had managed to do very well, and he hoped the shareholders would also be of this opinion. Dealing with the Company's works, the Chairman said those at Hendon were comparatively modern, and should be kept up to date. On the other hand, the Ayres Quay works were ancient, and much worn out; and the intended outlay there would still further lessen the cost of production.

## GAS v. ELECTRICITY AT ALDERSHOT.

In the "JOURNAL" for the 14th ult. (p. 457), reference was made to statements appearing in a local paper with regard to the comparative cost of gas and electricity for public lighting at Aldershot; and some interesting figures on the subject by Mr. R. W. Edwards, the Secretary and General Manager of the Aldershot Gas and Water Company, were reproduced. Mr. Edwards stated that, for the past year, 339 gas-lamps (incandescent and flat-flame) cost £779, or an average of £2 6s., against 42 electric lamps (arc and incandescent), costing £652 6s. 3d., or £15 10s. 7½d. per lamp.

In a subsequent letter to the Editor of the "Aldershot News," Mr. Frederick Garside, the Council's Electrical Engineer, refers to Mr. Edwards's figures, and says that by them "one is led to believe a gas-lamp at £2 6s. per annum is equivalent to an electric lamp at £15 10s. This is manifestly absurd. The electric lamps give an average of 350-candle power per post; while the gas-lamps only give about 40-candle power per post. It therefore follows that, to get the same amount of light from the gas-standards as we now get from the electric standards, would cost £2 6s. × 350 ÷ 40 = £20 per post, or £4 10s. more than the calculated amount for the electric post. He submits a statement showing the actual cost of street lighting by electricity and gas, in the town of Aldershot, at the present time.

*Year ended March* 31, 1906.

| | No. of Posts. | Actual Cost to Council. | Average Candle Power of Posts. | Average Price per Post. | Total Combined Candle Power. |
|---|---|---|---|---|---|
| Electricity . | 42 | £340 | 350 | £8 1 10 | 14,700 |
| Gas . . . | 339 | 779 | 40 | 2 6 0 | 13,560 |

"From a glance at the above," he says, "it will be seen that 42 electric posts, costing £340 per annum, give 14,700-candle power per hour; while 339 gas-posts, costing £779, or more than twice as much, only give 13,560-candle power per hour. From these figures we may reasonably deduce that, light for light, electricity works out at considerably less than half the cost of gas."

Mr. Edwards lost no time in replying to this. He remarks that if the Bermondsey Clause had been incorporated in the Aldershot Company's Order, the charges for the supply of energy would have been fixed at sufficient to meet the expenditure, which for the year ended March 31 last was £3882, or 4·58d. per unit sold. The average revenue from private consumers was 4·69d. per unit; while for street lighting, only 2·28d. per unit was charged. It is therefore, he says, obvious that there was an undercharge of 2·30d. per unit—equivalent to £312 1s. 9d. Coming to the question of candle power, and the comparison of one light and another, Mr. Edwards writes: "It is necessary to take the exact quantity of electricity and gas consumed by the street-lamps and the respective cost. During the year under review, the electric lamps consumed 32,566 units; the cost price to the Council being £621 9s. 3d., and the illuminating power which may be derived therefrom 16,283,000 candles, at an average cost of 9·16d. per 1000 candles. The net cost of the gas used for street-lamps during the period in question was £462 10s. 6d.; and the quantity consumed, 3,887,000 cubic feet. This quantity of gas will give a candle power of 77,742,000 candles, from incandescent burners, at a cost of 1·42d. per 1000 candles. Therefore electricity is at least six times dearer than gas."

## LIVERPOOL AND WATER GAS.

The question of the supply of water gas is again engaging attention at Liverpool; and a report has just been issued, through the Lighting Sub-Committee, on the subject. In an introduction to the document, Mr. A. G. Smith, the Superintendent of Street Lighting, states that, in accordance with instructions given by the Committee in July, he had analyses of the Liverpool gas made by Dr. F. J. Brislee of the University, to ascertain the percentage admixture of carburetted water gas. After reminding the Committee that in 1898 a Departmental Committee of the Home Office presented a report on the manufacture and use of water gas, and recommended, *inter alia*, that the proportion of carbonic oxide in the public gas supply at night should be limited to 12 per cent., Mr. Smith proceeds as follows:—"It will be seen from Dr. Brislee's report that in the south end of the city, where the carburetted water gas is manufactured, this figure is considerably exceeded, the greatest quantity—viz., 18·2 per cent.—being found in Seddon Road, Garston, at 9.30 p.m. As the districts selected by Dr. Brislee are almost identical with those chosen by Dr. Kohn in his report of 1900, the averages in each district may be given.

| Date of Reports. | District No. 1. | | District No. 2. | | District No. 3. | |
|---|---|---|---|---|---|---|
| | Percentage of Carbonic Oxide. | Approximate proportion of Carburetted Water Gas. | Percentage of Carbonic Oxide. | Approximate proportion of Carburetted Water Gas. | Percentage of Carbonic Oxide. | Approximate proportion of Carburetted Water Gas. |
| | | Per Cent. | | Per Cent. | | Per Cent. |
| 1900 | 8·6 | 9·75 | 17·5 | 44·4 | 10·6 | 17·8 |
| 1904 | 9·5 | 13·4 | 14·7 | 33·4 | 10·7 | 18·1 |
| 1906 | 8·3 | 9·0 | 14·1 | 31·1 | 10·4 | 17·1 |

It will therefore be seen that there is little alteration in the composition of the gas supplied to the City. One portion of the town is being supplied with an admixture containing an amount of carbonic oxide which, according to the Departmental Committee, is dangerous. The attention of the Gas Company has been called to this from time to time; but in the absence of any legislation on the subject, they have not seen fit to adopt the recommendations of the Departmental Committee. In December, 1904, a deputation from the Corporation waited on the Board of Trade, urging that the recommendations of the Departmental Committee should be embodied in a Bill; but, as far as the Superintendent is aware, nothing has been done up to the present."

In his report, Dr. Brislee points out that the object of the inquiry was to determine the proportion of carburetted water gas present in the illuminating gas supplied to the various districts—special attention being given to the composition of the gas supplied between the hours of 8 p.m. and 8 a.m. Thirty-two samples were analyzed from sixteen different parts of the city over a period of nine days (Aug. 7 to 15 inclusive); and for convenience and for the sake of comparison, these localities are grouped in the same manner as in his previous report of March, 1904. The approximate percentage of carburetted water gas was calculated from the average percentage of carbonic oxide found by Professor Crum Brown, of Edinburgh, in the carburetted water gas made at Garston in March, 1896—namely, 32 per cent.—and from the average of 6 per cent. of carbonic oxide which Dr. Brislee had previously found in the normal coal gas supplied to Liverpool. Dr. Brislee's remarks on the results of the analyses are as follows:—

District No. 1 (north of a line drawn east and west, passing through the University and Edge Hill Railway Station).—In this district, the supply consists of ordinary coal gas, containing comparatively speaking only a small percentage of carburetted water gas. The composition of the gas varies within fairly small limits; the proportion of carburetted water gas being greater in the early morning. District No. 2 (south of a line drawn from Wavertree Town Hall through Alexandra Drive to Park Street, S.).—The gas in this district contains a very large percentage of carburetted water gas; the maximum sample containing 18·2 per cent. of carbonic oxide, corresponding to 47 per cent. of carburetted water gas. District No. 3 (intermediate between Districts Nos. 1 and 2).—The percentage of carburetted water gas in the gas supplied to this district is subject to very considerable variations. The maximum is reached shortly before midnight; falling soon after midnight to 3·8 per cent. of carburetted water gas, and at midday to 1·5 per cent. His conclusion is that, "the gas supplied to Districts Nos. 1 and 3 may be considered fairly satisfactory; but the gas supplied to District No. 2 is unnecessarily and seriously dangerous, the danger from an escape of gas increasing in a much greater ratio than the percentage of carbonic oxide. The gas, however, possesses a very distinct and disagreeable odour; and hence a leak could be easily detected by the smell before any considerable amount of gas had escaped."

Dr. Brislee appends to the report the following complete analyses of a sample of gas from each of the three districts:—

| | District 1. | District 2. | District 3. |
|---|---|---|---|
| Carbon dioxide | 0·8 | 0·8 | 0·8 |
| Heavy hydrocarbons | 5·8 | 9·0 | 8·2 |
| Oxygen | 0·2 | 0·6 | 0·2 |
| Carbonic oxide | 7·6 | 17·8 | 15·4 |
| Methane | 36·3 | 28·7 | 31·2 |
| Hydrogen | 47·1 | 38·4 | 39·7 |
| Nitrogen | 2·2 | 4·7 | 4·5 |
| | 100·0 | 100·0 | 100·0 |

At the monthly meeting of the City Council, Dr. Caton called attention to the subject, and said he thought "they should get a Bill which would give them more power with regard to this great danger." After some discussion, Alderman Burgess suggested that the matter should be brought before the Health Committee. Accordingly, at the meeting of the Committee on the following day Dr. Caton introduced the question. He said he thought it was a very serious matter that, while the Committee were doing everything in their power to reduce the rate of mortality in the city, there should be allowed to exist a cause of serious injury to the health of the community. They were aware how exceedingly dangerous to life was the carbon monoxide which constituted the principal ingredient of water gas. It was practically impossible to make fittings absolutely gas-tight; and a very considerable amount of leakage took place. Under these circumstances, it was very serious indeed that so many thousands of people living in cottages, particularly in the South end of Liverpool, should be subjected to the risks arising from water gas. As a rule, these people did not realize how dangerous the inhaling of even a small quantity of this kind of gas might be. He knew of instances where a slight leakage had resulted in serious injury to health. In the South end, especially in Garston and Aigburth, there was frequently as much as 46 per cent. of water gas in the gas supply. The usual amount was about 36, 35, or 33 per cent.; and he maintained that this was an excessive quantity. There was something to be said for mixing water gas with illuminating gas. It diminished the cost very materially; but when the amount to which he had referred was put in, it became exceedingly dangerous to health. He suggested that the Parliamentary Committee should be asked to include in their next Omnibus Bill special provision enabling them to prosecute anybody who supplied gas containing more than the normal amount of water gas.

Alderman Purcell did not think it would be the slightest use for them to ask for power to deal with this matter in an Omnibus Bill for Liverpool. Whatever legislation was enacted, would have to be for the general good of the country, and not for any specific locality. When last they approached the President of the Local Government Board in regard to the grievance, he gave them very little encouragement. It might, however, be advisable to send a deputation to the present head of the Local Government Board, who might, perhaps, take a more sympathetic view of the subject. Mr. Hartley Wilson said he had suffered so much from the effects of water gas that he had ceased to use gas either at home or at his business premises. Dr. Caton added that the inhaling of even a small quantity of carbon monoxide produced anæmia, weakness, and feebleness in a most extraordinary manner.

It was resolved that certain members of the Committee should be appointed as a deputation to the President of the Local Government Board, and that the Lighting Committee should be requested to join.

## STOCKPORT CORPORATION GAS SUPPLY.

In moving the acceptance by the Stockport Town Council of the Borough Treasurer's annual report and statement of accounts for 1905-6, Alderman Bell, the Chairman of the Finance Committee, pointed out that the gas profits for the year were £29,735, or an increase of £1319; but owing to the Committee being allowed shorter periods for the repayment of capital moneys, it had been necessary to carry a largely increased sum to the depreciation account. This consequently reduced the net profit available to aid the rates to £10,058—£862 less than for the previous year. In the estimates made at the beginning of the year, it was thought that £10,300 could have been applied in aid of the rates; but the effect of what he had just referred to was that they still had £242 less than they calculated on. The capital account was drawn up on new lines, so as to show the total amount spent on the undertaking from the commencement. This made no difference in the general result; but it showed the assets of the Corporation to be so much more. The gas fund balance-sheet showed for the first time the contributions from revenue to capital during past years, which was the true surplus of the undertaking, and stood at £195,894.

Mr. M'Gregor remarked that there was a very fair increase in the sales of gas. The previous year they amounted to £80,579, and last year to £85,411. In the former year £9000 of the profits was handed over in relief of rates. This, based upon the sales, was 11·17 per cent. The amount to be contributed to the rates on the present occasion was £10,058, which was equal to 11·77 per cent.; so that a reasonable increase was to be handed over. He also wished to draw attention to the fact that the receipts from the residual products had increased from £16,224 to £16,860. What struck him as a less pleasing feature of the report of the Gas Committee was the cost of manufacture. On sales the previous year of £80,579, the cost of manufacture was £47,591; and last year, on sales of £85,411, the cost of manufacture was £50,607. In both years, in proportion to the sales, the cost of manufacture was 59 per cent. It seemed to him this was a very large percentage; and if the Gas Committee were to look for increased profits, they must turn their attention to the cost of manufacture. The department had had additional burdens to bear in the increase of wages amounting to £18,000; also increases of the amount transferred to depreciation account of £1450, capital charges £420, and liquidation of debt £1762. In the near future there was a large expenditure looming in the way of renewals and extraordinary repairs, such as he believed would tax the energies of the Corporation, if they were to keep up the amount to be handed over to the rates. He considered that this was in a great measure due to the depreciation in past years not being adequate, and not commensurate with the life of the plant. Had the depreciation been sufficiently allowed for in past years, these burdens would have been lightened.

On the other hand, the next speaker—Mr. Johnson—did not agree with Mr. M'Gregor's remarks about depreciation, and said he was perfectly satisfied with the way in which the Committee had done their work.

The Corporation are at the present time putting down at their Portwood works a large installation of inclined retorts, complete with coal and coke handling plant. It consists of four benches, each containing four settings of twelve retorts, or a total of 384 mouthpieces; and the whole of the settings, together with retort-bench ironwork, buckstaves, stage-floors, retort-fittings, the hydraulic and foul mains, tar-towers,

continuous coal-hoppers, measuring chambers, and charging-shoots, are being constructed and erected to the designs of Mr. S. Meunier, the Engineer and Manager, by Messrs. Gibbons Bros., Limited, of Dudley. It would be interesting to know if this is the first instance of settings of twelve retorts being placed in one arch. The benches are ingeniously arranged so that it is possible to work two ranges each containing 15 feet inclined retorts in a house 64 feet wide.

The Corporation have just placed an order with Messrs. Robert Dempster and Sons, Limited, of Elland, for fitting their patent type of hot-coke conveyor in front of these retorts; also a cross conveyor, taking the coke out of the house and depositing it into partially underground and partially above-ground coke-bins, or at option on to new type overhead sorting-screens, into overhead hoppers. The scheme is also complete with overhead crane gantry, and an electrically-driven travelling crane for stacking coke in the yard out of the coke-bin by means of skips, and loading coke from stock or from the coke-bins before-mentioned into carts or into the overhead hoppers by means of a grab. In this type of conveyor, the chain and all wearing parts are outside the trough, and away from coke dust and gritty water. The coal-handling plant consists of a coal-hopper, fitted with automatic feed to prevent the elevators being overloaded, cannel breaker, twin elevator, and push-plate conveyors, for filling the overhead coal-hoppers; all the conveyors (both coal and coke), elevators, &c., being electrically driven. The whole of this portion of the scheme is complete with all the latest appliances, such as automatic tightening gear, "Toogood's" patent equalizing gear, water quenching, &c.

## FINANCING MUNICIPAL ELECTRICAL UNDERTAKINGS.

### Result of Circular Inquiries from Aberdeen.

Complaints are frequently made regarding the practice of sending out circulars asking for information regarding the working of gas undertakings. The annual report of Mr. J. A. Bell, the Electrical Engineer to the Corporation of Aberdeen, shows that the practice is also known in the world of electricity; and probably the result of Mr. Bell's inquiries may be of interest, as throwing light on the methods which prevail of financing corporation electric undertakings.

Dealing first with the subject of outputs, costs, &c., he says: It will be noted that the output is only some 200,000 units in excess of last year. This is believed to be largely attributable to bad trade, and, in a lesser degree, to the use of more efficient lamps which it is now possible to obtain. The latter reason is a gratifying one, as the undertaking will benefit thereby eventually. Station costs show more economical results. The taxes and capital charges, however, are increased; and it is in connection with these that I wish the Committee to consider the policy that at present exists. In the Aberdeen Electric Lighting Order, 1890, the application of monies received has to be, broadly speaking, under four headings—namely, (1) The payment of working costs, maintenance, &c.; (2) interest on capital; (3) sinking fund; (4 providing a reserve fund up to 10 per cent. on the capital expenditure. No provision is made in our Act for depreciation, though hitherto it has been the practice of the department to depreciate yearly by writing down the capital in addition to the statutory sinking fund. There is no question that this practice is a prudent one, and so long as we had the old generating station and obsolete plant to dispose of, the amount annually set aside under this heading was warranted in the circumstances. It will be apparent that when an undertaking brought to an up-to-date condition is charged with the repayment of loan capital during a fixed period, that to charge it also with an annuity for the purpose of providing another amount largely in excess of the sinking fund under the name of depreciation, is practically charging the present consumers of electricity with over twice their share of capital expenditure—a course which does not appear to be equitable nor altogether necessary, when it is also borne in mind that all maintenance and repairs are charged to revenue. It will be seen that our depreciation and reserve accounts amount to 23·8 per cent. of our capital outlay; and while it may be no guide to see what other undertakings are doing in this matter, it is perhaps of interest as a comparison.

Inquiries were made of the 194 municipal electrical departments at present in existence, and 171 replies were received. Of these 171, 125 have not laid anything aside for depreciation other than their statutory sinking fund. Combining the amounts set aside for depreciation and reserve, I find there are 114 out of the 171 undertakings that have laid aside portions of their surplus as shown below. The other 57 have made no provision for either—

| No. of Undertakings. | Percentage of Combined Depreciation and Reserve on Capital Outlay. |
|---|---|
| 23 | under 1 per cent. |
| 23 | between 1 and 2 ,, |
| 16 | ,, 2 and 3 ,, |
| 12 | ,, 3 and 4 ,, |
| 9 | ,, 4 and 5 ,, |
| 8 | ,, 5 and 6 ,, |
| 8 | ,, 6 and 7 ,, |
| 3 | ,, 7 and 8 ,, |
| 4 | ,, 8 and 9 ,, |
| 2 | ,, 9 and 10 ,, |
| 1 | ,, 10 and 11 ,, |
| 2 | ,, 11 and 12 ,, |
| 1 | ,, 12 and 13 ,, |
| 2 | ,, 16 and 17 ,, |

I am aware that many undertakings in the South have not obtained the same favourable terms as to repayments of loans as Aberdeen, and therefore their sinking fund may be slightly higher than our own. Still, I submit for the Committee's consideration that, while in no way endangering the stability of the undertaking, it is not necessary to lay aside such large sums annually for depreciation, in view of our having now wiped out any losses on our old generating station. I further submit that the depreciation fund, which now amounts to £39,454, should be available for the replacement of obsolete plant, should such a contingency arise at any future time.

## ILKESTON CORPORATION GAS DEPARTMENT.

At last Tuesday's meeting of the Ilkeston Town Council, the following report of Mr. F. C. Humphrys, the Engineer and Manager, on the working of the Gas Department for the year ended March 31, was presented and received very favourably.

The gas made was 99,585,700 cubic feet, against 96,895,300, an increase of 2,690,400 feet. This is the more favourable, as the department has lost much of its best-paying custom owing to the competition of the Electricity Department, which represents a loss of over 15,000,000 cubic feet of gas per annum. This difference, and the 2,690,400 cubic feet advance, are made up by the large increase in the number of small (chiefly slot) customers. The coal consumed was 9900 tons, against 9871 tons last year, an advance of only 29 tons. So that, although the income from gas has risen from £11,363 to £11,678, the cost of manufacture has fallen from £7156 to £7152. There has unfortunately, owing to a general slackness in trade, been a big drop in the revenue from residual products, from £4377 to £3993. The distribution charges have gone up from £865 to £1079, owing to a renewal of mains in Cotmanhay and Awsworth Road, and also part of the cost of new services and fixing of cookers. Rates and taxes are over £100 more—advancing from £966 to £1069. The total expenditure has been £10,040, against £9706; the increase being accounted for by the cost of mains, cookers, &c., mentioned before, and also the replacement of an obsolete exhauster. The total revenue has been £16,229, against £16,276. During the year the price of gas for power purposes has been reduced 3d. per 1000 cubic feet. The balance in hand will provide for the usual payments for interest and sinking fund, larger sums placed to the reserve and depreciation fund, and by taking a small amount from the unappropriated balance carried forward last year to make a larger contribution to the rates. The number of ordinary consumers at Lady-day was 1164, an increase of 13; of slot customers, 3274, an increase of 280; and of cookers, 1470, an increase of 305.

## GAS-STOVE DEVELOPMENT IN STAFFORDSHIRE.

An interesting and enjoyable gathering took place on Saturday afternoon last at the Cannon Iron Foundries, Deepfields, Staffordshire; the occasion being the 80th anniversary of the establishment of the concern. The Directors embraced the opportunity of having a fitting celebration of the event; and accordingly they extended hospitality to their workpeople on a most extensive scale. During the afternoon deputations from various parts of the country visited the works, which cover some 16 acres of ground, and are situated on both sides of the London and North-Western Railway between Birmingham and Wolverhampton. Established in the year 1826, by Mr. Edward Sheldon, the business has grown and prospered; and to-day there are over 800 persons employed. This number sat down to a sumptuous repast provided by the Directors on Saturday evening, in the fitting-shops of the new works now nearing completion in connection with the Gas-Stove Department of the Company. The room is a very spacious one, being 75 feet in width and 135 feet long; and there are a number of other rooms of similar size in the new buildings which are to be exclusively set apart for the manufacture of gas-stoves. The total cost of the buildings, together with the introduction of an up-to-date plant for the generation of electricity for lighting and power purposes, is £20,000.

At dinner, the chair was occupied by Mr. R. Clayton, J.P. (Chairman of the Directors), who was supported by Messrs. E. S. Barnett and W. H. Hawthorne (Directors), Dr. A. Smith, J.P., Mr. B. Whitehouse, J.P., Mr. J. Mason (Secretary), &c. The loyal toast was duly honoured; and then Mr. Whitehouse proposed "The Cannon Iron Foundries, Limited, and the Directors," to which the Chairman and Mr. W. H. Hawthorne responded. Other toasts followed; and during the evening there was a very pleasing innovation in the formal introduction to the workpeople of five of the Directors' sons, who will eventually take part in the management of the business. Those introduced were Messrs. R. Douglas Barnett Clayton, Herbert Sheldon Hawthorne, Frank E. Sheldon Clayton, R. Talbot Clayton, and W. Edgar Hawthorne. On behalf of the workpeople, Messrs. E. Crump and W. Hawkins presented each of the first four gentlemen with a silver cigar and silver card case; while Mr. W. Edgar Hawthorne was the recipient of a silver card case and a silver sovereign purse as a souvenir of the occasion. Messrs. Douglas Clayton and Herbert Hawthorne returned thanks for the presents, and were most cordially received.

The Cannon Holloware Works rank among the most important of industrial undertakings in the Black Country. The manufacture of gas-stoves (which is only one of the departments) is an engaging branch. The various patterns are at the outset made in lead, which metal is more efficiently manipulated in regard to the very fine work necessary than would be the case with wood. A permanent iron pattern is then cast from the lead; and from this are made the moulds for the casting of the various parts of the stoves. The gas-stove department will in the course of the next three or four months be considerably extended by the erection of the substantial buildings referred to, which will consist of excellent warehouses, testing and japanning shops, dressing and finishing shops, and foundry. The manufacture of gas-stoves has been successfully carried on in the old works, where some 300 persons are now regularly engaged in this particular branch of the business. For twelve years past the firm have been manufacturing complete gas-stoves; but for a long time previously they supplied castings to regular gas-stove makers. They were also supplying their "Porceliron" enamel. This was so successful that twelve years ago the Company launched out and made a distinct department for the production outright of gas cooking and heating apparatus. The trade developed rapidly; and three years ago the Company had to erect new foundries at the old works to cope with the business. The

output is now more than ten times what it was twelve years ago. The Company's productions are in considerable demand for export, and to Canada and Australia large consignments of gas-stoves are being sent. Their speciality is the "Porceliron" enamelling, the advantage of which is said to be that it greatly increases the durability of the cookers. It is claimed that it has greater heat reflecting properties than ordinary sheet enamel, and this makes for efficiency in the stoves as well as durability.

A railway siding is brought up to the new works; and the firm make their own Dowson gas, which is used to drive three 50-horse power engines, and these in turn operate the dynamos which light the works, and supply most of the power for the machinery throughout the place.

## MUNICIPALITIES AND PRIVATE TRADERS.

Under the heading of "Retail Tradesmen and Municipal Trading," last Saturday's issue of "The Ironmonger" contains two references to the question of the competition of local governing bodies with private traders.

The first is to Coventry, where, after receiving a memorial from the ironmongers and gas-fitters of the town bearing upon the rivalry between the Corporation and the traders, the Gas Committee discussed the matter with a deputation. The General Secretary of the Ironmongers' Federated Association, in introducing the deputation, stated that as large ratepayers and private traders of Coventry, the traders represented objected to the Corporation competing with them. The ironmongers and gas-fitters, like other tradesmen, had to pay rates, and were actually finding a portion of the money the Gas Committee were using in competition with them. This was palpably unfair to their trades; but at the same time the Corporation were not competing with other tradesmen, and so it was obvious that a special injustice was being done to the ironmongers and gas-fitters. No complaint, as far as he knew, had been made of the work executed in the town by these traders. No complaints from the Gas Committee's Engineer or inspectors had reached them; but when a tender was put out for certain work, the private traders had lost it through the Corporation taking it at a less figure. The trade had not the profit arising from the manufacture of gas to fall back upon; and it was most unjust that the Committee should use this profit when taking into account an estimate for private work. The deputation strongly appealed to the Committee to discontinue this class of trading, and to leave the trade free to do all internal work beyond the meter. One member of the deputation stated that the ironmongers and gas-fitters were prepared to give an undertaking to carry out all work to the satisfaction of the Gas Committee's Engineer. They would agree to their work being inspected, and to conditions being framed as to fitting up with iron pipe or compo, and any other matters of detail. It was arranged that the Town Clerk should communicate the Committee's reply to the deputation.

The second case is Huddersfield, which our contemporary remarks is one of the most recent municipalities to receive enlarged parliamentary powers with regard to electric equipments for lighting and motive purposes. These powers are conferred in an Omnibus Act which has lately received the Royal Assent. Hitherto the Corporation's powers in regard to furnishing electric supplies were limited to laying the service wires from the mains to the meters in the premises of consumers. Under the new Act, they may authorize the full installation of premises; but the actual work must be done by contractors. A provision securing the latter condition was agreed to after a good deal of correspondence with representatives of local electrical firms and negotiation with the Association of Electrical Contractors; and for this reason the Bill was not opposed in the House of Lords.

## Gas-Workers' Allotments and Thrift Society at Newport.

The prizes to the successful competitors in the cultivation of allotments and gardens at Crindau, held by employees of the Newport (Mon.) Gas Company, were recently distributed by the Chairman (Mr. R. Laybourne, D.L., J.P.) and Directors of the Company, who were accompanied by the Secretary (Mr. T. H. Hazell) and the Engineer and Manager (Alderman T. Canning). Mr. Laybourne said it afforded the Board the greatest pleasure to meet the men once again, and they were also pleased with the excellent report they had received from the Judge (Mr. Grant, F.R.H.S) on the success of the labour in the gardens and allotments. Mr. Canning having read Mr. Grant's report, Mr. Laybourne remarked that he was pleased to see that so many of the employees had taken advantage of the Thrift Society, and no doubt had found it of great benefit to them. The rate of interest had been increased from 3 to 4 per cent., which was more by 1½ per cent. than they could get from the Post Office Savings Bank. He was also pleased to say that some of the members had saved sufficient through the Thrift Society to invest in the Company's or other stock, for which they would receive a higher rate of interest. He hoped more of them would interest themselves in the Society, and put a little of their earnings away each week. He would also like to see them deposit with the Society their bonus grant received each year. He then distributed the prizes for allotments, and Dr. H. M. Brewer (a Director) followed with those for gardens; the holders of both being congratulated upon their fine display of vegetables and fruit, and their success at the Newport Horticultural Show. Encouraging remarks were added by the other Directors present.

**Gas Purchase Question at Pontefract.**—On the recommendation of the Gas and Water Committee, the Pontefract Town Council have decided to give notice to the Gas Company of their intention to purchase the undertaking. This step has, of course, been taken under the Pontefract Corporation Act of the past session.

## LEEDS CORPORATION WATER-WORKS.

### Abandonment of the Colsterdale Reservoir Site.

It was stated in last week's "JOURNAL" that the Leeds Water Committee had decided to recommend the City Council to adopt the advice of the Water-Works Engineer (Mr. C. G. Henzell, M.Inst.C.E.) and Mr. Henry Rofe, M.Inst.C.E., to abandon the Colsterdale reservoir and to substitute for it a new scheme.

At the meeting of the City Council last Wednesday, Mr. J. H. Armitage, the Chairman of the Water Committee, moved the resolutions embracing this proposal, which were reproduced last Tuesday (p. 655). He said the Committee had to justify two things—the abandonment of the old bank and works and the substitution of the new scheme now proposed; and in order to clear up certain misconceptions, a brief review of the history of the work might be of value. In 1901, application was made to Parliament for the whole of the scheme, in support of which expert evidence was called. The evidence was of the usual kind, because no test could be made in the valleys, as the land belonged to other owners. The experts, therefore, had to decide upon a superficial view of the valleys. They considered the sites proposed were suitable for water-works, and the best available for Leeds. They also considered that reservoirs could be built in each of the four valleys. From the position which had then been taken up, there was no removal; and the reasons for the Bill stood as good as they did when they went before Parliament. In consequence of the abandonment of a small reservoir originally intended to be built, the Colsterdale bank was to be made 15 feet higher than originally intended, so as to hold sufficient water to compensate for the loss of that reservoir. The Bill was eventually passed into law; and they got power to go immediately on to the land, and at both Leighton reservoir and Colsterdale certain trial-holes and bore-holes were sunk from January, 1902, to June, 1903. They sank four trial shafts, varying from 60 to 100 feet in depth. Notice to treat with Lord Masham, the owner of the land, was given; and experts were called in to give evidence at the arbitration. By the aid of trial-holes and bore-holes, the experts were now able to go into far greater detail than when they could merely look at the place from a distance. Then, for the first time, they found that on the north side of the Colsterdale embankment there was 137 feet of boulder clay resting on from 15 to 35 feet of unsuitable soft clay. This would necessitate the making of an extremely deep trench, with additional wing trenches at each side. Very special precautions, they were informed at the arbitration, would have to be taken to secure the stability of the bank; and the only way to do this would be to weight the material of the embankment so that it could not move. At the arbitration, it was perfectly plain from the expert evidence that the embankment was going to cost far more money and trouble than they had expected when they went to Parliament. The plans were prepared; and he would point out that with these plans the experts had nothing whatever to do. They never saw them, and they were never submitted to them—being prepared by their own Water Engineer and his staff. Their Engineer did not follow the advice of the experts; and subsequently the Council unanimously decided that another Water Engineer would have to be appointed. The new Engineer, Mr. Henzell, at once began to look into the matter; and so serious did it appear, that, on his advice, one of the experts who had given evidence at the arbitration—Mr. Henry Rofe—was called in. From June, 1905, until August of this year, continual research had been going on in the Colsterdale and the Leighton valleys. During the time, 47 trial-holes had been sunk, varying from 10 to 172 feet in depth; and 22 bore-holes had also been sunk, the deepest of which was 169 feet. If they had decided to go on with the construction of the Colsterdale reservoir on the original site, and to carry the trench downward until it rested on a safe foundation, the cost would have been, not £296,000 as they were led originally to expect, but nearly £1,000,000. Leeds could not afford this expenditure, except in the direst need of water; and if they had not been able to bring forward an alternative scheme, they would have had no hesitation in advising that the reservoir should be entirely abandoned for the time being. But they had an alternative scheme; and the site chosen was very satisfactory. The drift was confined to ground in the bottom of the valley. The bank would be 335 yards long, against 610 yards in the original scheme; and the thick shales on which the trench would finish were 100 feet nearer the surface, so that the trench would be only 180 feet deep, as compared with 290 feet, which would have been necessary to make the originally proposed embankment safe. The total capacity of the new reservoir and the Leighton reservoir would be 2262 million gallons, against 2143 millions in the scheme which first went before Parliament, while costing nearly £585,000 less than would have been necessary to ensure the safe construction of the Colsterdale reservoir on the site first chosen. He wished to pay a tribute to the arduous services rendered by Mr. Henzell, and by Mr. J. Swales, the Resident Engineer, both of whom had worked hard in order to cope with the difficult situation.

The resolution was agreed to; and subsequently the Council ordered the construction of the Leighton reservoir—the second of the series of four for which parliamentary sanction was obtained—to be proceeded with immediately.

**Inefficient Gas-Fittings at Nottingham.**—Presiding over a meeting of the Nottingham and District Ratepayers' Association, Mr. J. Mann dealt with certain aspects of the gas question, and said that, on careful investigation, it was found the cause of many complaints as to the quality of the gas supplied did not rest with the gas at all, but with inefficient fittings. In correspondence he had had with him, the Gas Engineer (Mr. J. H. Brown) said there was not a single case in which they had not been able to remedy bad light by the examination, and perhaps restoration, of the fittings. The speaker stated that he had received 117 letters of complaint in answer to a request he inserted in the Press. Mr. Brown had promised to personally conduct a deputation from the Association over the gas-works, and explain the process of manufacture.

## NOTES FROM SCOTLAND.

**From Our Own Correspondent.**

*Saturday.*

It has been arranged that the new section of the Granton Gas-Works will be formally opened on Monday, Oct. 15. The ceremony is to be performed by Lady Cranston, wife of the Lord Provost of Edinburgh, and Mrs. Mackie, wife of the Provost of Leith.

The accounts of the Aberdeen Corporation Gas Department, referred to in last week's "Notes," were adopted by the Town Council on Monday, without a shadow even of dissent. The position of the undertaking is one of which the Corporation may well be proud. To be able to sell gas at 2s. 7d. per 1000 cubic feet at such a distance from the coal supply is indicative of the very best of management, both in the present and in the past. The opportunity for economic working having been provided by the Corporation, it rested with the Manager to make the best of his advantages; and no one can say otherwise than that Mr. S. Milne, the Engineer and Manager, has fully availed himself of every opportunity in his power. He was appointed to the charge of a thoroughly up to-date establishment; and he is keeping it so. When the undertaking is spoken of as up-to-date, the reference is not to the physical side only, but includes also the financial side. That this portion of it has not been neglected, is apparent from the fact that the items of annuities and interest paid do not together amount to much more than £5000; while nearly £10,000 has been carried out of profits to the fund for the redemption of mortgage.

The annual meeting of the St. Andrews Gas Company was held yesterday—Mr. A. Aikman presiding. The report of the Managers stated that the quantity of gas manufactured during the year was 53 million cubic feet—an increase over the previous year of 2,300,000 cubic feet. There had also been an increase of consumers, more especially those supplied through prepayment meters. Gas-cookers were greatly in demand; there being cookers on hire, to the value of £1000. The customary dividend of 50s. per share, with a bonus of 10s. per share, was declared. The Chairman said they were in a strong, sound financial position. The year's working had been one of the most successful since the formation of the Company. It had exceeded expectation, and was largely due to the care and attention of Messrs. Hall, the Managers. The report was adopted.

In the Newport (Fife) Town Council on Monday, Mr. J. P. Robertson, the Convener of the Gas Committee, submitted the estimates of the Committee for the current year, and their recommendations, which included the reduction of the price of gas from 4s. to 3s. 10d. per 1000 cubic feet; the increase of the salary of the Manager by £20; and the allowance of £250 for depreciation of works and plant. The undertaking, Mr. Robertson said, was in a very healthy and flourishing condition. The increase in consumption had gone beyond what even the most sanguine of them had anticipated. It was moved, as an amendment to the recommendation of the Committee, that £750 be placed to the credit of a depreciation and renewal fund. After discussion, the recommendations of the Committee were adopted.

It is nearly a year since the new water supply from the Talla was introduced into Edinburgh and Leith. Statistics which have been published this week show that at this time last year the quantity of water in store was 776 million gallons, and that on Tuesday last the quantity was 5550 million gallons. As a consequence, the Water Trustees have been able to distribute over 18 million gallons of water daily, as compared with less than 16 million gallons a year ago. Then, most satisfactory of all, while the rainfall at the two old stations of Glencorse and Gladhouse since Jan. 1 was 28·94 and 26·37 inches respectively—the corresponding figures being 18·87 and 17·31 inches—the rainfall at Talla this year has been as much as 32·26 inches. With all this wealth of water, there are grievous complaints as to scarcity in the eastern end of the city, which, however, is explained by the inefficiency of the mains; and the Water Trustees are said to be seriously considering the situation.

The Water Committee of the Aberdeen Town Council last week adopted the following report: The Committee have had under consideration the remit, dated Oct. 2, 1905, to prepare a supplementary report in regard to the proposed scheme for obtaining a supply of water from the River Avon. With the view of obtaining fuller and more detailed information regarding the nature and cost of the works proposed under this scheme, they have again consulted the Engineers (Messrs. Hawksley), and instructed them to make such further surveys as were necessary to enable them to report more accurately upon these points. The Committee also communicated with His Grace the Duke of Richmond and Gordon, in the hope of being able to arrange a meeting to discuss any objections the Duke might have to the proposed scheme; but they regret to have to report that the Duke of Richmond and Gordon did not see his way to meet the Committee at the present time. The Committee beg to submit a plan showing the site of the proposed intake and balancing reservoir in the valley of the River Avon, and the line of the aqueduct between the intake and the city. The intake, with its necessary incidental works, will be placed just above the confluence of the Burn of Loin with the River Avon, about 3 miles above the shooting lodge at Inchrory, and the balancing reservoir is proposed to be constructed near the Findouran hut, about 5 miles above the intended intake. The aqueduct will be in tunnel for about 8½ miles of its length; the remaining 40 miles consisting of iron pipes. A high-level service reservoir, to hold 3 million gallons of water, is proposed to be placed near Countesswells, at an elevation of 460 feet above Ordnance datum; being about 60 feet above the existing high-service tank at Hillhead. A roadway is proposed to be constructed from Delnadamph to afford access to the intended works in the Avon valley. The works proposed to be constructed are designed to carry a maximum flow of 12½ million gallons per twenty-four hours; and the estimated cost of the works is £940,000.

The thirty-second annual Congress of the Incorporated Sanitary Association of Scotland was held in Leith on the Thursday and Friday of this week. One of the subjects discussed was that of dust upon roads. It came up in the opening address of the President—Mr. J. Bryce, Assoc.M.Inst.C.E., the Burgh Surveyor of Partick. He advocated the procuring of legislative powers, a greatly increased grant to local authorities towards meeting the additional maintenance required on roads, and authority to borrow money for the re-paving of existing roads with some form of dustless paving. In this connection, the coating or sprinkling of roads with solutions, and painting with oil or tar, was referred to as producing a large abatement of the dust nuisance; but it was asserted the almost unanimous advice of experts was that roads should be laid down of material which would provide a waterproof surface, and be non-productive of the objectionable dust. Then it was mentioned that a district surveyor in Fifeshire had constructed a machine for forcing tar, under pressure, into the material of road surfaces, which, for economy and efficiency, promised to solve the problem of providing dustless roads in country districts.

## GAS COMPANIES' STOCK AND SHARE LIST.

**Referred to on p. 688.**

| Issue. | Share. | When ex-Dividend. | Dividend or Dividend & Bonus. | NAME. | Closing Prices. | Rise or Fall in Wk. | Yield upon Investment. |
|---|---|---|---|---|---|---|---|
| £ | | | p.c. | | | | £ s. d. |
| 590,000 | 10 | Apl. 11 | 10½ | Alliance & Dublin 10 p.c. | 21—22 | .. | 4 15 5 |
| 160,000 | 10 | ,, | 7½ | Do. 7 p.c. | 14¾—15¼ | .. | 4 16 9 |
| 200,000 | 5 | May 11 | 7 | Bomt ay, Ltd.. . . . | 6¾—7¼ | .. | 4 16 7 |
| 40,000 | 5 | ,, | 7 | Do. New, £4 paid | 5—5¼ | .. | 5 1 10 |
| 50,000 | 10 | Aug. 30 | 14 | Bourne- ) 10 p.c. . . | 28—29 | .. | 4 18 9 |
| 51,810 | 10 | ,, | 7 | mouth Gas ) B 7 p.c. . | 16¾—17¼ | .. | 4 1 3 |
| 53,200 | 10 | ,, | 6 | and Water ) Pref. 6 p.c. | 15⅝—16⅝ | .. | 3 12 9 |
| 380,000 | Stk. | Aug. 15 | 12½ | Brentford Consolidated | 260—265 | .. | 4 14 4 |
| 300,000 | ,, | ,, | 9½ | Do. New . . . | 198—203 | .. | 4 13 7 |
| 50,000 | ,, | ,, | 5 | Do. 5 p.c. Pref. . | 120—125 | .. | 4 0 0 |
| 206,250 | ,, | June 14 | 4 | Do. 4 p.c. Deb. . | 103—106 | .. | 3 15 6 |
| 220,000 | Stk. | Mch. 9 | 11½ | Brighton & Hove Orig. | 234—239 | .. | 4 14 2 |
| 246,320 | ,, | ,, | 8½ | Do. A. Ord. Stk. . | 167—172 | .. | 4 15 11 |
| 160,000 | 20 | Apl. 11 | 10 | British . . . . . | 41⅝—42½ | .. | 4 14 1 |
| 104,000 | Stk. | Aug. 15 | 6 | Bromley, Ord. 5 p.c. . | 119—123 | .. | 4 17 7 |
| 165,700 | ,, | ,, | 4½ | Do. do. 3½ p.c. . | 90—93 | .. | 4 16 9 |
| 500,000 | 10 | May 11 | 7 | Buenos Ayres (New) Ltd. | 12⅜—12⅝ | .. | 5 9 10 |
| 250,000 | Stk. | June 28 | 4 | Do. 4 p.c. Deb. . | 96—98 | .. | 4 1 8 |
| 150,000 | 20 | July 12 | 8½ | Cagliari, Ltd. . . . . | 24—26 | .. | 6 6 11 |
| 100,000 | 10 | June 14 | 10 | Cape Town & Dis., Ltd. | 15—16 | .. | 6 5 0 |
| 100,000 | 10 | Apl. 26 | 4½ | Do. 4½ p.c Pref.. . | 9¾—10¼ | .. | 4 7 10 |
| 50,000 | 50 | May 2 | 6 | Do. 6 p.c. 1st Mort. | 52—54 | .. | 5 11 1 |
| 50,000 | Stk. | June 28 | 4½ | Do. 4½ p.c. Deb. Stk. | 58—100 | .. | 4 10 0 |
| 1,443,280 | Stk. | Aug. 30 | 5⅛ | Commercial 4 p.c Stk. . | 112—115 | .. | 4 10 5 |
| 560,000 | ,, | ,, | 5 | Do. 3½ p.c. do. . | 110—112 | .. | 4 9 3 |
| 475,000 | ,, | June 14 | 3 | Do. 3 p.c. Deb. Stk. | 84—86 | .. | 3 9 9 |
| 800,000 | Stk. | ,, | 6½ | Continental Union, Ltd. | 123—126 | .. | 5 3 2 |
| 200,000 | ,, | ,, | 7 | Do. 7 p.c. Pref. | 140—145 | .. | 4 16 7 |
| 452,070 | Stk. | Aug. | 5½ | Derby Con. Stk. . . . | 122—124 | .. | 4 8 9 |
| 55,000 | ,, | July | 4 | Do. Deb. Stk. . . . | 105—107 | .. | 3 14 9 |
| 486,690 | 10 | July 27 | 11 | European, Ltd. . . . | 24—25 | .. | 4 8 0 |
| 354,060 | 10 | ,, | 11 | Do. £7 10s. paid | 18—19 | .. | 4 6 10 |
| 15,203,110 | Stk. | Aug. 15 | 4⅛ | Gas- ) 4 p.c. Ord. . . | 99—100 | .. | 4 8 0 |
| 2,600,000 | ,, | ,, | 3½ | light ) 3½ p.c. max. . | 87—89 | .. | 3 18 8 |
| 3,799,735 | ,, | ,, | 4 | and ) 4 p.c. Con. Pref. | 108—111 | .. | 3 12 1 |
| 4,193,975 | ,, | June 14 | 3 | Ccke ) 3 p.c. Con. Deb. | 86—88 | .. | 3 8 2 |
| 258,740 | Stk. | Mch. 9 | 5 | Hastings & St. L. 3½ p.c. | 100—105 | .. | 4 15 3 |
| 82,500 | ,, | ,, | 6½ | Do. do. 5 p.c. | 121—124 | .. | 5 4 10 |
| 70,000 | 10 | Apl. 11 | 11 | Hongkong & China, Ltd. | 20—21 | .. | 5 4 9 |
| 940,000 | Stk. | May 11 | 8 | Imperial Continental . | 187—190 | +2 | 4 4 3 |
| 473,600 | Stk. | Aug. 15 | 3½ | Do. 3½ p.c. Deb. Red. | 95—97 | .. | 3 12 2 |
| 183,242 | Stk. | Aug. 30 | 6 | Lea Bridge Ord. 5 p.c. . | 120—125 | .. | 4 16 0 |

| Issue. | Share. | When ex-Dividend. | Dividend or Dividend & Bonus. | NAME. | Closing Prices. | Rise or Fall in Wk. | Yield upon Investment. |
|---|---|---|---|---|---|---|---|
| £ | | | p.c. | | | | £ s. d. |
| 561,000 | Stk. | Aug. 30 | 10 | Liverpool United A . . | 230—232 | .. | 4 6 2 |
| 718,100 | ,, | ,, | 7 | Do. B . | 168½—170½ | .. | 4 2 1 |
| 306,083 | ,, | June 28 | 4 | L'rpool Unit'd Deb. Stk. | 107—109 | .. | 3 13 5 |
| 75,000 | 5 | June 28 | 5 | Malta & Medn., Ltd. . | 4¼—4⅝ | .. | 5 5 3 |
| 560,000 | 100 | Apl. 2 | 5 | Met. of ) 5 p.c. Deb.. | 103—105 | .. | 4 15 3 |
| 250,000 | 100 | ,, | 4½ | Melbourne ) 4½ p.c. Deb. | 102—104 | .. | 4 6 7 |
| 541,920 | 20 | May 31 | 3½ | Monte Video, Ltd. . . | 11—12 | .. | 5 16 8 |
| 1,675,892 | Stk. | Aug. 15 | 4½ | Newc'tle & G'tesh'd Con. | 110—112 | .. | 4 2 7 |
| 406,625 | Stk. | June 29 | 3½ | Do. 3½ p.c. Deb. | 97—100 | .. | 3 10 0 |
| 15,000 | 10 | Aug. 30 | 10 | North Middlesex 10 p.c. | 20—21 | .. | 4 15 3 |
| 55,940 | 10 | ,, | 7 | Do. 7 p.c. | 138—142 | .. | 4 16 7 |
| 300,000 | Stk. | May 11 | 8 | Oriental, Ltd. . . . | 150—153 | .. | 5 4 7 |
| 60,000 | 5 | Mch. 28 | 7 | Ottoman, Ltd. . . . | 6—6½ | .. | 5 7 8 |
| 398,490 | 5 | Apl. 26 | 7 | Primitiva Ord. . . . | 6¾—7¼ | .. | 4 16 7 |
| 796,980 | 5 | July 27 | 5 | Do. 5 p.c. Pref. . | 5—5¼ | -⅛ | 4 15 3 |
| 488,900 | 100 | June 1 | 4 | Do. 4 p.c. Deb. . | 97—99 | +1 | 4 0 10 |
| 851,070 | 10 | Apl. 26 | 7 | River Plate Ord. . . . | 12⅝—13 | .. | 5 7 8 |
| 300,000 | Stk. | June 28 | 4 | Do. 4 p.c. Deb. . | 96—98 | .. | 4 1 8 |
| 250,000 | 10 | Mch. 28 | 8 | San Paulo, Ltd. . . . | 14¼—14⅜ | .. | 5 5 8 |
| 70,000 | 50 | July 2 | 5 | Do. 5 p.c. Deb. . | 49—51 | .. | 4 18 0 |
| 135,000 | Stk. | Mch. 28 | 10 | Sheffield A . . . . | 244—246 | .. | 4 1 4 |
| 209,984 | ,, | ,, | 10 | Do. B . . . . | 244—246 | .. | 4 1 4 |
| 523,500 | ,, | ,, | 10 | Do. C . . . . | 244—246 | .. | 4 1 4 |
| 70,000 | 10 | May 31 | 10 | South African . . . . . | 16—17 | .. | 5 17 8 |
| 6,350,000 | Stk. | Aug. 15 | 5½ | South Met., 4 p.c. Ord. | 132—134 | +1 | 4 2 1 |
| 1,895,445 | ,, | July 12 | 3 | Do. 3 p.c. Deb. | 86—88 | .. | 3 8 2 |
| 575,000 | Stk. | Aug. 15 | 5½ | S'th Suburb'n Ord. 5 p.c. | 122—123 | .. | 4 8 0 |
| 60,000 | ,, | ,, | 5 | Do. 5 p.c. Pref. . | 123—126 | .. | 3 19 4 |
| 112,533 | ,, | July 12 | 5 | Do. 5 p.c. Deb. Stk. | 128—133 | .. | 3 15 2 |
| 502,310 | Stk. | May 11 | 5 | Southampton Ord. . . | 107—112 | .. | 4 9 3 |
| 120,000 | Stk. | Aug. 30 | 6¼† | Tottenham ) A 5 p.c. . | 125—130 | .. | 5 0 0 |
| 328,020 | ,, | ,, | 5†† | and ) B 3½ p.c. . | 100—103 | .. | 4 17 1 |
| 137,500 | ,, | June 28 | 4 | Edmonton ) 4 p.c. Deb. | 103—105 | .. | 3 16 2 |
| 182,380 | 10 | June 14 | 8 | Tuscan, Ltd. . . . . | 10½—10⅝ | .. | 7 8 10 |
| 149,900 | 10 | July 2 | 5 | Do. 5 p.c. Deb. Red. | 100—103 | .. | 4 17 1 |
| 30,000 | Stk. | Aug. 15 | 8 | Wands- ) A 5 p.c. . . | — | .. | — |
| 255,636 | ,, | ,, | 6½ | worth ) B 3½ p.c. . . | 137—142 | +2 | 4 11 7 |
| 75,000 | ,, | ,, | 5⅝ | and ) C 3½ p.c. . . | 113—115 | +2½ | 4 17 5 |
| 79,416 | ,, | June 28 | 3 | Putney ) 3 p.c. Deb. Stk. | 82—85 | .. | 3 10 7 |
| 279,875 | ,, | Aug. 15 | 5⅛ | West Ham 5 p.c. Ord. . | 105—107 | .. | 4 15 9 |
| 185,000 | ,, | ,, | 5 | Do. 5 p.c. Pref. . . | 120—123 | .. | 4 1 4 |
| 193,300 | ,, | June 28 | 4 | Do. 4 p.c. Deb. Stk. | 103—106 | -1 | 3 15 6 |

Prices marked * are "Ex div." † Next dividend will be at this rate.

bright. The wide-spread adoption of electric motors supplied with energy from large central power stations, the installation of gas-producer plants, and the adoption of gas and oil engines and motors, would, in a very short period, have a marked effect on the condition of the atmosphere in industrial centres; and when they added to this the increased use of gas-cookers, and the highly improved form of domestic grates, which would, in themselves, contribute in no mean measure to the diminution of the evil, the future was, in his opinion, full of promise.

## CURRENT SALES OF GAS PRODUCTS.

### Week ending Sept. 8.

In London, the pitch market continues to harden. 31s. 6d. per ton net has been done for this year, and 32s. is now required; and a premium is being asked for next year. Benzol 90 per cent. is in very good demand; 10¼d. net having been paid in several instances, and 10½d. is now asked. Crude carbolic 60° remains in about the same position as before, at from 1s. 9d. to 1s. 9½d. Ordinary London creosote is much inquired for; and 2¼d. net and naked has been done again quite recently. Cresylic acid is also rather better. Sulphate of ammonia remains without change.

**Sulphate of Ammonia.** LIVERPOOL, *Sept.* 8.

There has been a steady demand for prompt delivery, but a sufficient supply to meet it, so that prices remain unaltered at the different ports. The closing quotations are £11 17s. 6d. per ton f.o.b. Hull, and £12 per ton f.o.b. Liverpool and Leith. There has been more inquiry for October-December delivery, and a fair amount of business has been done at a premium on prompt prices of 2s. 6d. to 5s. per ton, according to position. January-April and January-June are quoted £12 10s. per ton f.o.b. Leith without inducing business. At other points £12 7s. 6d. per ton is the nearest value of January-June; and this price has been paid for January-September f.o.b. Leith.

**Nitrate of Soda.**

Owing to scarcity of local supplies, spot prices have been advanced to 11s. 7½d. and 12s. per cwt. for 95 per cent., and refined qualities respectively.

**Tar Products.** LONDON, *Sept.* 8.

Markets have been firm during the past week, and prices have had a decidedly upward tendency. Pitch has been very firm indeed; and manufacturers report sales all round, both to the end of the year and to March next, at improving prices. London manufacturers maintain their quotations of 32s. to 32s. 6d.; and it is reported that they have obtained 31s. 6d. for forward delivery, but over what period is not known. On the east coast, business is reported at good prices for delivery to the end of the year; while on the west coast, the market is very firm indeed. The Liverpool values are quite equal to those prevailing on the east coast. On the south coast, sales are reported at 30s., but for delivery to a convenient French port. On the Continent, there is not a great deal of business doing. Manufactures are still holding off the market; while it is reported that low prices have been accepted for pitch of Belgian and French manufacture. Creosote has been steady. The London manufacturers are very firm in their ideas, and are evidently short of stock, and anticipate an increased demand from America during the coming year. A small quantity was sold at 2d. at works; but most of the manufacturers are asking 2¼d. In the North, the makers are short of stock and very firm in their ideas, and are asking from 1⅞d. to 1¾d.; but a sale is reported at 1 7/16d. on the east coast. The demand for solvent naphtha is steady, especially for actual London qualities, which for prompt delivery are fetching high prices. In the North, business is reported at 1s. 1d. and 1s. 1½d. for prompt and forward delivery. Continental consumers refuse to pay more than 1s. 9d. for 60's on the east coast, but manufacturers will not accept this price. Business is again reported to have been done to the end of the year at 1s. 8¾d. at makers' works. There is no change in the value of crystals; and no business is reported. There is no change in toluol. Sales are reported at 1s. 1½d. on the east coast; while London makers are asking 1s. 2d. and 1s. 2½d. for the small quantities they may have to spare. There is evidently an improved demand for 90 per cent. benzol. In London 10d. and 10½d. have been realized, and makers are now firm at the latter price. In 50-90 per cent., the demand continues very good indeed. In Manchester, 11½d. is reported to have been paid; while on the east coast, 11¾d. to 1s. is asked.

The average values during the week were: Tar, 15s. to 19s. 6d. Pitch, London, 29s. to 30s.; east coast, 28s. 6d. to 29s.; west coast, 27s. 6d. to 29s. Benzol, 90 per cent., 9¾d. to 10¼d.; 50-90 per cent., 11¼d. to 11½d. Toluol, 1s. 1½d. to 1s. 2d. Crude naphtha, 4¼d. to 4½d.; solvent naphtha, 1s. 1d. to 1s. 2½d.; heavy naphtha, 1s. to 1s. 1d. Creosote, London, 1 15/16d. to 2d.; North, 1½d. to 1¾d. Heavy oils, 2¼d. Carbolic acid, 60 per cent., 1s. 9d. to 1s. 9¼d. Naphthalene, £4 10s. to £9 10s.; salts, 27s. to 28s. Anthracene, "A" quality, 1½d. to 1⅝d.

**Sulphate of Ammonia.**

Markets have been steady but quiet during the past week; and there has not been very much business doing. The principal London Companies maintain their quotation of £12 2s. 6d.; but business has been done at under this, both upon London and Beckton terms. In Leith, the market has been quiet. Makers are not inclined to quote anything less than £12 2s. 6d.; but £12 has been accepted for second-hand parcels for prompt. In Hull, the value may be taken as £11 17s. 6d. to £11 18s. 9d.; and at the latter price business was done for a good make for September shipment. In Liverpool, the position is about the same. There are sellers at £12; but buyers will not exceed £11 17s. 6d. to £11 18s. 9d.

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LEST YE FORGET.

## COAL TRADE REPORTS.

**Lancashire Coal Trade.**

The trade in house coal continues very flat. For engine fuel, there is a good demand. For steam purposes there is, perhaps, less doing than in the West and South Yorkshire districts. Rather more gas coal and cannel are going out than during the past three months. Sales of these commodities have latterly increased in a somewhat substantial degree. Shipping coal is quiet. Furnace coke is in fair request. On the whole, the coal trade of the county may be reported steady. There is no alteration to record in average prices.

**Northern Coal Trade.**

The ease in the Northern coal trade, which was referred to last week, has made itself more noticeable now; but there is also a lowering of the prices of one or two kinds of coal. By a few, this is attributed to the desire of some firms abroad to reduce the stocks that they have before the coal tax lowers prices. Best Northumbrian steams are now from about 10s. 4½d. to 10s. 6d. per ton f.o.b., second-class steams are 9s. 9d. to 10s., and steam smalls from about 6s. to 6s. 3d. The collieries, however, are fairly well supplied with contracts, and the production is taken up largely by these; but there does not seem quite so much being booked for forward sale. In regard to gas coals, there is, on the other hand, an increase of the home consumption that is now growing more rapidly, so that there is less coal to put into the open market for sale. Durham gas coals vary from about 9s. 9d. to 11s. per ton f.o.b., according to quality. The best kinds do not seem over plentiful; while the other classes appear in ample supply as yet, though the growing demand will make them scarcer soon. As to contracts, there is very little doing at present; and it is possible that some for foreign buyers are held back, so that the shipment may be after the end of the coal tax. Coke is very firm; but the increase in the production of gas coke makes its price weaker with some of the inland makers who have full stocks. Export prices are unchanged.

**Scotch Coal Trade.**

Trade continues without much change as to quantity; the shipping demand being still great. As to price, splint is moving upward. Other sorts, although in good demand, and especially steam coal, remain much about the same. The quotations are: Main 8s. to 8s. 3d. per ton f.o.b. Glasgow, ell 9s. to 10s., and splint 9s. 6d. to 9s. 9d. The shipments for the week amounted to 286,698 tons—a decrease of 13,252 tons upon the preceding week, but an increase of 43,664 tons upon the corresponding week of last year. For the year to date, the total shipments have been 9,135,030 tons—an increase of 1,045,529 tons upon the same period of 1905.

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Responding to a petition from the East Coast fishermen, Trinity House have now ordered that the Pakefield lighthouse is to continue to be used until early next year, when gas-buoys are to be substituted.

## New Water-Works for Scunthorpe.

In the presence of a large number of people, Lord and Lady St. Oswald last Friday afternoon opened the new water-works at Scunthorpe; the ceremony being followed by a public luncheon. Great satisfaction is felt at the successful completion of the scheme; for a previous effort to obtain a good supply of water had proved a failure. After spending about £5000 on a deep bore, the water turned out to be salty and unfit for domestic use. The Council had therefore to seek another source; and this was found in the north-east of the town, where 2 acres of land were obtained, including the site of the reservoir at the top of Sawcliffe Hill, 2 miles away. At the pumping station a catchment was built 150 feet long, 22 feet deep, and 11 feet wide, with two bores in it, and a plentiful supply of beautiful water was secured. Two sets of engines were put down, each capable of pumping 25,000 gallons per hour, into the reservoir, which has a capacity of 750,000 gallons. The power station for generating the electricity for pumping is at the gas-works, Scunthorpe; and the electricity is conveyed to the pumps 5 miles aways by means of armoured cables. The service reservoir is a covered one, and is 100 feet above the town. The contract for the installation of power, plant, cables, and pumps was secured by the British Westinghouse Company; and that for the covered reservoir by Mr. H. J. Thompson, of Scunthorpe. The pipes were supplied by the Sheepbridge Coal and Iron Company. The cost of the scheme is £17,013; and the work has been carried out under the superintendence of Mr. A. M. Cobban, the Council's Engineer.

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**Claims for Damages at Nottingham.**—It is stated that two writs have been served upon the Town Clerk of Nottingham, as acting for the Corporation, claiming an injunction to restrain the defendants, their servants, and agents from polluting the water in the plaintiffs' wells, and also claiming damages. For some time past complaints have been received from the two firms referred to—who are brewers and bleachers respectively—of pollution of water alleged to have been caused by operations at the Basford Gas-Works; while other firms have also complained of damage and injury to their businesses caused by the processes of gas manufacture carried on at the works, and threaten proceedings in regard thereto.

**Clutton District Water Supply.**—The Clutton Rural District Council have applied to the Local Government Board for sanction to borrow £22,000 for purposes of water supply to the parishes of Camely, Clutton, Farmborough, Farrington Gurney, High Littleton (with Hallatrow), Paulton, Stoneaston, and Timsbury, including the construction of a reservoir with a capacity of 150,000 gallons in the parish of Timsbury, and the execution of works in the urban district of Midsomer Norton and the parishes of Binegar and Emborow. At the local inquiry which was held, Mr. William F. Bird, of Midsomer Norton, the Engineer for the scheme, explained the plans, and stated that the inadequacy of the present supply had been acknowledged.

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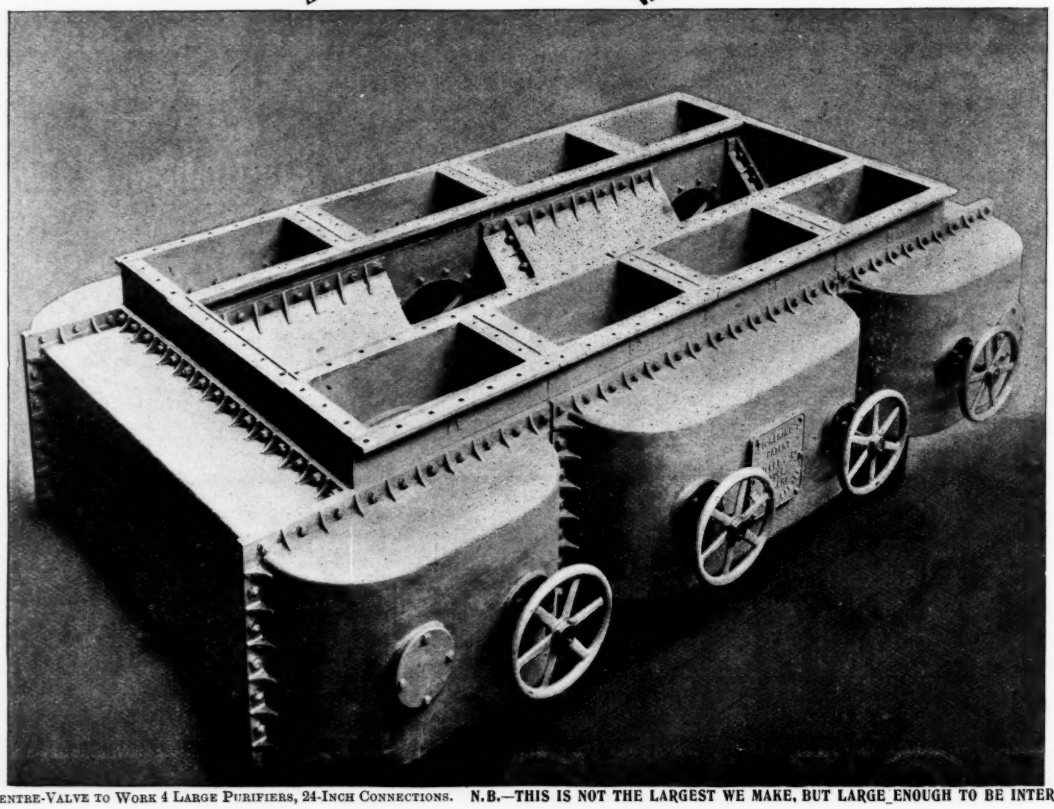

VIEW OF CENTRE-VALVE TO WORK 4 LARGE PURIFIERS, 24-INCH CONNECTIONS. N.B.—THIS IS NOT THE LARGEST WE MAKE, BUT LARGE ENOUGH TO BE INTERESTING.

**New Joint-Stock Company.**—The Slindon Water-Works Company has been registered, with a capital of £10,000 in £1 shares, to take over as a going concern the undertaking for supplying water to the village of Slindon, Sussex, and to adopt an agreement with Mr. C. R. A. Leslie. There will be no initial public issue.

**Euston Station in Darkness.**—Considerable inconvenience and confusion were caused at Euston last Tuesday night by the sudden extinction of the electric light at 7.15 p.m., and for three-quarters of an hour departing passengers had to find their trains and seats, and grope in the refreshment-rooms for food, by very inadequate gas and candle light. The cause of the failure is not known; but the electric lighting was resumed again about eight o'clock.

**Proposed Water-Works Purchase at Stowmarket.**—The advisability of purchasing the Stowmarket Water-Works is at present being considered by the Urban District Council, who on Friday held a meeting for the purpose of receiving a report from the General Purposes Committee on the matter. A resolution was carried that, subject to the consent of the Local Government Board, the Council should accept the offer of Messrs. Greene, King, and Sons, Limited, to sell their water undertaking for £9500; and it was decided to apply to the Local Government Board for power to borrow £10,000 for the purpose.

**Water Shortage at Wrexham.**—In consequence of the prolonged drought, the Wrexham Water Company have been compelled (for the first time in the history of the undertaking) to withdraw the trade supply of water. The domestic supply is also shut off between certain hours. In an interview, the Engineer (Mr. Frederick Storr) said the Company were giving 17 gallons per head per day, which would be ample if only consumers would exercise reasonable care, and avoid unnecessary use and waste. In six weeks a new reservoir, having a capacity of 135 million gallons, will be completed. During the past three months, the rainfall has only reached 4 inches; while the average fall exceeds 11 inches.

**Gas-Workers' Hours at Darlington.**—The question of the hours and wages of the workers employed at the Darlington Gas-Works was mentioned at Thursday's meeting of the Town Council. Mr. Crooks moved a resolution that accounts of the hours and wages of men employed at the gas-works should be furnished, and said it was reported that some of the men's hours had been increased from 48 and 56 per week to 72 and 84, and that there had been no increased pay. The motion having been seconded, Alderman Barron replied that stoking machinery was recently put into the works, and other new arrangements made; the new conditions being under consideration by the men and the management. No member of the Gas Committee wished to inflict any hardship on the workmen. Mr. Crooks's resolution was not brought forward in the interests of the town. It was not true that the men were compelled to work four hours a day more. Mr. Crooks retorted that he hoped attention would be given to the matter, or the town might be found in darkness. The resolution was lost.

**A Gas Supply for Coppull.**—Acting on the recommendation of the Gas Committee, the Chorley Corporation have passed a resolution that application be made to the Local Government Board for a Provisional Order to alter and amend section 147 of the Chorley Improvement Act, 1871, in order that powers may be granted to borrow the sum of £5000 for the purpose of supplying gas to the township of Coppull.

**Increased Discount at Belfast.**—A lengthy discussion took place in the Belfast County Borough Council with regard to a decision of the Gas Committee that the present discount of 10 per cent. on gas accounts should be increased to 15 per cent. It was explained that at the present time the undertaking was making a net profit of £50,000 a year, while the proposed concession would involve an amount of £7000. The proposal was agreed to.

**Gas Explosion at Hove.**—Damage estimated to amount to about £400 was caused by a gas explosion which took place in the kitchen of a house at Hove last Tuesday. The cause of the accident is not definitely known; but it is thought that the electric wires from the road into the scullery may have fused, and melted the gas-pipe just over the inner door of the scullery. The gas thus released gradually filled the scullery, kitchen, and servants' room to such an extent as to suffocate a dog and bird, and eventually became ignited.

**Liverpool and the Supply of Water to Birkenhead.**—Among the business set down for consideration at last week's meeting of the Liverpool City Council was the recommendation of the Water Committee that their report as to the proposed supply of water to Birkenhead be approved, and that such a supply be given on the terms and conditions embodied in the heads of agreement. Alderman Burgess, the Chairman of the Committee, however, said it had been conveyed to him that it was the wish of the Council to refer a matter of such importance to a special meeting. He agreed to the suggestion; and the consideration of the subject was accordingly adjourned for a fortnight.

**The Reduced Price of Gas at Wrexham.**—In the "JOURNAL" for the 28th ult., it was announced that the Directors of the Wrexham Gas Company had reduced the price of gas by 6d. per 1000 cubic feet. We learn that the reduction made is 3d. per 1000 cubic feet of gas used for all purposes, as from the commencement of the current quarter. The gross charge will, until further notice, be 2s. 9d. within the mile radius, instead of 3s. 6d. as hitherto. The discounts per 1000 cubic feet will (for prompt payment) be: On gas used for lighting only, 3d.; on gas used for cooking (separate meter), 6d.; on gas used for motive power (separate meter), 9d. The differential rates for cooking and heating and motive power are intended to encourage the consumption of gas in the daytime. Prepayment consumers have not been overlooked. Owing to the difficulty and inconvenience of changing the wheel mechanism, it has been decided not to interfere with the slot meters, which are gauged to supply 24 cubic feet of gas for 1d.; but a cash discount of 3d. per 1000 cubic feet consumed will be returned to consumers by the collector.


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| Blackburn | 1,250,000 | Winnipeg, Man. | 500,000 | Malton | 150,000 |
| Windsor St. Works, Birmingham | 2,000,000 | Colchester (Second Contract) | 300,000 | Smethwick | 500,000 |
| Saltley Works, Birmingham | 2,000,000 | York | 750,000 | Gravesend | 300,000 |
| Colchester | 300,000 | Rochester | 500,000 | Pernambuco, Brazil | 125,000 |
| Birkenhead | 2,250,000 | Kingston, Ont. | 300,000 | Duluth, (Second Contract) | 300,000 |
| Devizes | 120,000 | Crystal Palace District | 2,000,000 | Leicester (Second Contract) | 1,000,000 |
| Saltley, Birmingham (Second Contract) | 2,000,000 | Duluth, Minn. | 300,000 | Newport (Second Contract) | 250,000 |
| Windsor St., Birmingham (Second Contract) | 2,000,000 | Caterham | 150,000 | Brockville | 250,000 |
| Halifax | 1,000,000 | Leicester | 2,000,000 | Toronto (Third Contract) | 750,000 |
| Toronto | 250,000 | Enschede, Holland | 150,000 | Montreal, Ont. (Second Con.) | 1,800,000 |
| Ottawa | 250,000 | Buenos Ayres (River Plate Co.) | 700,000 | Toronto (Fourth Contract) | 1,000,000 |
| Lindsay (Remodelled) | 125,000 | Burnley | 1,500,000 | Hamilton, Ont. | 400,000 |
| Montreal | 500,000 | Kingston-on-Thames | 1,750,000 | Rochester (Third Contract) | 1,600,000 |
| Toronto (2nd Cont., Remodelled) | 2,000,000 | Accrington | 500,000 | Leeds (Second Contract) | 900,000 |
| Belleville | 250,000 | Tonbridge | 300,000 | Buenos Ayres (Primitiva Co.) | 1,200,000 |
| Ottawa (Second Contract) | 250,000 | Stretford | 500,000 | Buenos Ayres (New Co.) | 1,200,000 |
| Brantford (Remodelled) | 200,000 | Oldbury | 300,000 | Christchurch, N.Z. | 300,000 |
| St. Catherines (Remodelled) | 250,000 | Todmorden | 500,000 | Rochdale | 1,600,000 |
| Kingston, Pa. | 125,000 | Saltley, Birmingham (Third Contract) | 2,000,000 | St. John's, Newfoundland | 250,000 |
| Peterborough, Ont. | 250,000 | York (Second Contract) | 750,000 | Brantford (Second Contract) | 400,000 |
| Wilkesbarre, Pa. | 750,000 | Rochester (Second Contract) | 500,000 | Smethwick (Second Contract) | 500,000 |
| St. Catherines (Second Cont.) | 250,000 | Newport (Mon.) | 250,000 | Pentypridd | 250,000 |
| Buffalo, N.Y. | 2,000,000 | Tokio, Japan | 1,000,000 | Montreal (Third Contract) | 1,800,000 |
| | | Newcastle-on-Tyne | 1,800,000 | Guelph, Ont. | 50,000 |
| | | Leeds | 1,800,000 | Buenos Ayres (River Plate Co.) Second Contract | 750,000 |
| | | | | Belgrano (River Plate Co.) | 500,000 |

**And, in addition, COAL GAS PLANTS at NELSON, B.C., CHATHAM, BERLIN, NAPANEE, OWEN SOUND CALGARY, and WINNIPEG.**

**Reduction to Slot Consumers at Gainsborough.**—As from the 1st prox., users of prepayment gas-meters at Gainsborough are to be allowed a discount amounting to 1d. for every 500 cubic feet of gas consumed, which will place the general body of consumers on an equal footing. In making the announcement, a local paper remarks that, considering the manner in which Mr. John Baldwin (the Engineer and Manager) is handicapped by heavy capitalization, he is accomplishing very satisfactory results.

**The Outbreak of Enteric at Fleetwood.**—Of the several officers attacked with enteric fever in the camp at Fleetwood, to which reference was made last week (p. 648), four have succumbed. The others are progressing favourably, although some are still in danger. Meanwhile, a thorough investigation is being made into the cause of the outbreak, both by the military authorities and the District Council. The latter have urged the Local Government Board to send down an independent medical inspector to inquire into the facts on the spot.

**Electric Light Failure at Ventnor.**—Owing to the fusing of a main cable at Ventnor last Saturday week, there was some fear that a performance which was announced to take place at the Pavilion would have to be abandoned. About seven o'clock consumers learnt that there was something amiss, by a visit from the representative of the Electric Light Company telling them there would be no light for a time, but that they hoped to effect repairs within an hour or two. All hands at once set to work at the Pavilion; and with a supply of chimneys, mantles, &c., and skilled help from a local firm, the discarded gas-fittings were got into working order, and the curtain rose to time in a by no means badly-lighted hall. Before the performance was concluded, the Electric Light Company had effected repairs.

**Gas from Peat.**—Under this heading, Mr. C. J. Dolan, M.P., writes to the "Freeman's Journal," in which he refers to a statement in the report of the Cork Industrial Development Association, to the effect that a communication had been received from a firm who were anxious to develop the peat and mineral industries of Ireland. The nationality of the firm was not mentioned; but Mr. Dolan asks why an Irish company should not be formed for the manufacture of gas from peat. He says there is "plenty of capital in Ireland for the purpose; and the peat industry offers a wide field for industrial enterprise. It has been tried most successfully in Holland; and there is no reason why it should not be equally, if not more, successful in Ireland. To allow a London syndicate to reap the profits of this industry would be a national crime. Irish capitalists are always ready to send their money abroad. Here is an opportunity of investing it at home, and doing an immense service to Ireland." Mr. Dolan concludes by remarking that a very small amount of capital is needed to finance a peat industry, and that he will be happy to communicate with any persons interested in the matter.

## APPLICATIONS FOR LETTERS PATENT.

18,601.—Coxhead, G., "Rendering incandescent burners self-lighting." Aug. 20.
18,602.—Coxhead, G., "Mantles." Aug. 20.
18,607.—Chesterfield, N. A., "Holders for cards, being attached to meters." Aug. 20.
18,625.—Glover, T., Wayte, W. H., and Hands, G., "Gas cocks or valves." Aug. 20.
18,669.—Duff, J. R., "Igniting and extinguishing gas." Aug. 21.
18,680.—Simmance, J. F., and Abady, J., "Gas analysis apparatus." Aug. 21.
18,686.—Lynde, F. C., "Producing petrol gas." Aug. 21.
18,701.—Mouneyrat, A., "Burners." Aug. 21.
18,769.—Twyford, T. W., and Moore, T. C., "Gas-fired pottery kilns." Aug. 22.
18,858.—Farnsworth, J., "Igniting gas, &c." Aug. 23.
18,879.—Bradley, W. H., "Gas-producer." Aug. 23.
18,934.—Taylor, S., "Pendants or chandeliers." Aug. 24.
18,941.—Price, H. A, and Turner, H. C., "Gas-heated refuse destructor." Aug. 24.
18,966.—Jones, D., "Rotary engines, meters, &c." Aug. 24.
19,010.—Turner, F., "Inverted burners." Aug. 25.
19,048.—Deschamps, J. J., "Gas-producers." Aug. 25.
19,113.—Bloxam, A. G., "Mantles." A communication from A. & E. Henkels. Aug. 27.
19,115.—Sellers, F., Capel, C., and Wallis, F. G., "Generating steam for conversion into water gas in suction and pressure gas producer plants." Aug. 27.
19,154.—Zweigle, G., "Dry meter." Aug. 27.
19,197.—Kellner, A., "Incandescent mantle supports." Aug. 28.
19,225.—Robson, G., "Lighting and extinguishing from a distance street and other gas lights." Aug. 28.
19,283.—Macfarlane, J., "Igniting coal by gas." Aug. 29.
19,332.—Moores, W., and Petrides, G., "Manufacturing air gas." Aug. 29.
19,339.—Ehmann, C. P., "Mantle guard." Aug. 30.
19,385.—Sankey, M. H. P. R., "Pressure-gauges for suction-gas producer plants." Aug. 30.
19,406.—Haddan, H. J., "Inverted burners." A communication from Atkien-Gesellschaft C. H. Stobwasser and Co. Aug. 30.
19,431.—Northcott, J. H., "Chimneys and globes." Aug. 31.
19,450.—Heimburger, A., and Filler, P., "Incandescent burners." Aug. 31.
19,457.—Fritsch, R., "Liquid meters." Aug. 31.
19,499.—Lange, G., "Measuring the flow of liquid in pipes." Aug. 31.
19,503.—Schofield, A., "Dry meters." Sept. 1.
19,513.—Hubbard, W. S., "Automatically analyzing mixed gases, and recording the percentage therein of one of the gases." Sept. 1.
19,539.—Marks, E. C. R., "Gas-engines." A communication from the Southwark Foundry and Machine Company. Sept. 1.


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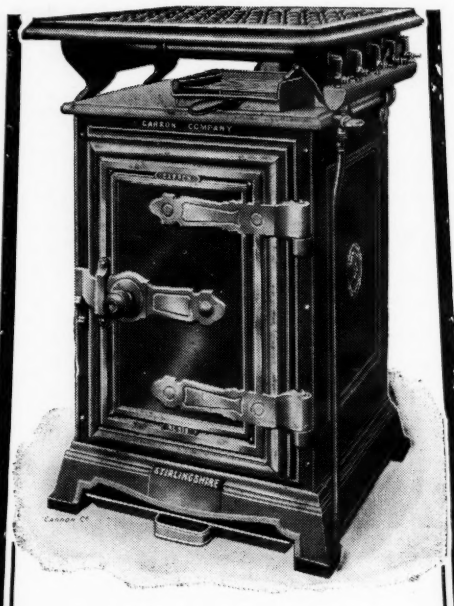


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A man named Frederick Stephen Wood, of Maidstone, was on Saturday found dead in bed from gas poisoning; all the taps of the burners in the room having been turned on.

Experiments with oil tar are declared by Mr. Burrows, the Surveyor of the Latham and Burscough Council, near Southport, to have solved the dust problem, besides preventing mud. The annual cost is £22 per mile for a road 6 yards wide.

Mr. Will Thorne, M.P., the "Tribune" says, is seriously ill, and all his engagements for the immediate future have been cancelled. Mr. Thorne has hardly been himself since he was attacked and knocked about by Cornwall miners a few months ago.

The Llanelly Gas Company have decided to lay a direct line of new gas-mains to Burry Port, a distance of about 4½ miles, and have accepted the tender of Messrs. Willey and Co., Limited, of London and Exeter, for the whole of the work, which is now being rapidly proceeded with. The same firm have also obtained the contract for the slot installations for both Llanelly and Burry Port.

In the "JOURNAL" last week, we announced the sudden death of Mr. Arthur Currer Briggs, the well-known colliery proprietor, and ex-Mayor of Leeds. Though a medical certificate was given that Mr. Briggs had died from heart failure, the family expressed a wish for its judicial confirmation, owing to certain distressing rumours which had been circulated as to possible self-destruction. An inquiry was accordingly held last Tuesday by Mr. J. C. Malcolm, the Leeds City Coroner, when, after medical evidence had been given to the effect that Mr. Briggs's heart was so gravely disorganized that he was liable to expire suddenly at any moment, the Jury expressed themselves as quite satisfied that death was due to natural causes.

The Borough Treasurer of Crewe last Wednesday reported that there was a surplus of about £4000 on the electric light undertaking; and the Finance Committee decided to invest £3000 of it in "some safe security."

At the North London Police Court on Saturday, William Padain, a stoker, of Abbott Street, Kingsland, was remanded on a charge of stealing 5s. 11d. from an automatic gas-meter in his house, the property of the Gaslight and Coke Company. According to the police, Padain signed a statement, in which he said he opened the meter and took the money to buy food for his dying child. His mother's meter was opened in the same way last Saturday, and 10s. taken out; but he said he did not do that. When charged at the police station, he said: "I did not steal it, I only borrowed it."

It is stated by "The Times" that the success of the aluminium works erected near the Falls of Foyers has led to the formation of a scheme for the construction of similar works on a much more extensive scale at Kinlochleven, on the borders of Inverness-shire and Argyllshire. The place chosen has an abundant supply of cheap water power. The catchment basin has an area of 55 square miles; and the rainfall in the district is said to be one of the heaviest in the British Isles. At an elevation of 1000 feet above sea-level, there is an excellent site for a reservoir in the centre of this basin. The reservoir will be about 7½ miles in length, with an average width of over ½-mile; and when it is completed, it will probably have the largest capacity of any artificial reservoir in Europe. It has been calculated that the approximate capacity of the reservoir will be something like 20,000 million gallons. The whole undertaking will cost over £500,000; and the period of construction is estimated at three years.


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**GENERAL Foreman Wanted. Must** have had Mechanical Training and good all-round Experience, and understand Manufacture of Sulphate and Carburetted Water-Gas and the operation of Regenerative Furnaces. Above all, he must be capable of controlling workmen with consideration or severity as occasion may require.
Commencing Salary, £2 10s. per week. Next Year, House, Coals, and Gas will be provided, and in the meantime an allowance will be made of 10s. per week.
Applications, not later than the 17th of September, endorsed "General Foreman," stating Age, Experience, and Two References, to be addressed A. E. BROADBERRY, Engineer and Manager, Gas-Works, TOTTENHAM.

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**WANTED to take on Lease a Small** GAS-WORKS, with or without option of Purchase.
Address No. 4646, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

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**TWO Livesey Washers for Sale, in good** condition, 6 ft. by 4 ft. by 3 ft. Maximum Capacity, 30,000 cubic feet per hour; 5 ft. by 3 ft. 6 in. by 2 ft. 6 in., 20,000 cubic feet.
Address No. 4648, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

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**GAS PLANT for Sale—I can always offer** NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

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CORPORATION OF LEICESTER.
SULPHURIC ACID.
**THE Gas and Electric Lighting Com**mittee of the above Corporation are prepared to receive TENDERS for the supply of SULPHURIC ACID made from either native Sicilian Brimstone, recovered Sulphur, or Pyrites. Specific gravity in each case to be stated. The price to include free delivery by rail into elevated Tanks, 27 feet high, at the Chemical Works, Aylestone Road.
Probable quantity, about 2000 Tons, to be delivered as required during the ensuing Twelve Months.
Tenders, addressed to Mr. Councillor Edwards, Chairman, and endorsed "Tender for Acid," to be delivered at these Offices, not later than Eleven o'clock a.m., on Saturday, Sept. 22, 1906.
The Committee do not bind themselves to accept the lowest or any Tender.
ALFRED COLSON, M.Inst.C.E.,
Engineer and Manager.
Gas Offices, Millstone Lane,
Leicester, Sept. 8, 1906.

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PATENTS, DESIGNS, AND TRADE MARKS ACTS, 1883 TO 1902.
**NOTICE is Hereby Given, that Dr.** CARL FREIHERR AUER VON WELSBACH, of 69, Wiedner Haupstrasse, Vienna IV., Austria, seeks LEAVE TO AMEND THE SPECIFICATION OF LETTERS PATENT No. 16,853 of 1903, granted to him for "Manufacture of Metallic Alloys having Pyrophoric Action and their Application to the purpose of Ignition of Illumination."
Particulars of the proposed Amendment were set forth in the "Illustrated Official Journal (Patents)" issued on the 5th of September, 1906.
Any person or persons may give NOTICE OF OPPOSITION to the Amendment (on Form "G") at the Patent Office, 25, Southampton Buildings, London, W.C., within One Calendar Month from the date of the said "Journal."
C. N. DALTON,
Comptroller-General.
Messrs. ABEL AND IMRAY,
Consulting Engineers and
Chartered Patent Agents,
Birkbeck Bank Chambers,
Southampton Buildings, London, W.C.
Agents for the Applicant.